

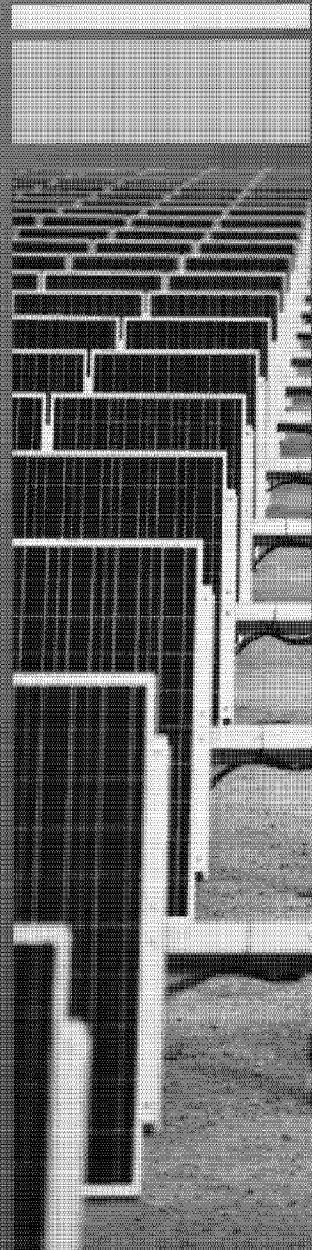
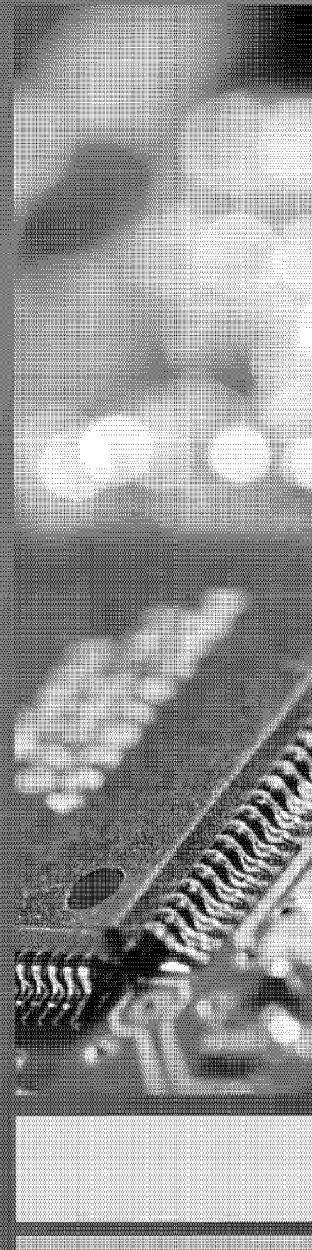
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THE EVOLVING IP MARKETPLACE

ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION

MARCH 2011



FEDERAL TRADE COMMISSION

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THE EVOLVING IP MARKETPLACE:
ALIGNING PATENT NOTICE AND REMEDIES
WITH COMPETITION

A REPORT OF THE
FEDERAL TRADE COMMISSION

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Acknowledgments:

The Commission thanks the Hearings participants for the contribution of their expertise and time to this project.

The Commission thanks the Berkeley Center for Law and Technology and the Competition Policy Center at the University of California at Berkeley for hosting Hearings in Berkeley, California.

**THE EVOLVING IP MARKETPLACE:
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INTRODUCTION

Innovation benefits consumers through the development of new products, processes and services that improve lives and address unmet needs. It is key to meeting society's greatest challenges in areas as diverse as energy production, communications and health care, and it is essential to sustained economic growth and global competitiveness. But innovation is a complex process. It involves a series of steps from idea to invention through development to commercialization, each of which can be expensive, risky and unpredictable.

The goal of the patent system is to promote innovation in the face of that expense and risk. It does so by giving patent owners the right to exclude others from making, using or selling a patented invention for 20 years. By preventing copying that might otherwise drive down prices, the patent system allows innovators to recoup their investment in research and development (R&D). The patent system plays a critical role in promoting innovation across industries from biotechnology to nanotechnology, and by entities from large corporations to independent inventors.

The patent system's exclusive right promotes innovation, but so too does competition, which drives firms to produce new products and services in the hope of obtaining an advantage in the market. The patent system and the antitrust laws share the fundamental goals of enhancing consumer welfare and promoting innovation. The legal doctrines that most successfully accomplish those goals align the patent system and competition policy so that one does not undermine the effectiveness of the other. One important aspect of that alignment is antitrust enforcement that recognizes the incentives to innovate created by the patent system. Condemning efficient, legitimate uses of patent rights can undermine those incentives and harm consumers. For that reason, the guidance of the 2007 FTC/DOJ Report on IP and Antitrust focused on incorporating careful consideration of the benefits of patent rights into antitrust analysis.¹ Another aspect of that alignment is a proper balance between exclusivity and competition. Invalid or overbroad patents disrupt that balance by discouraging follow-on innovation, preventing competition, and raising prices through unnecessary licensing and litigation. For that reason, many of the recommendations in the 2003 FTC IP Report focused on improving patent quality as a means of balancing exclusivity and competition.²

¹FED. TRADE COMM'N & DEPT. OF JUSTICE ANTITRUST DIV., ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION (April 2007), available at <http://www.ftc.gov/reports/innovation/P040101PromotingInnovationandCompetitionrpt0704.pdf>

²FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY, Exec. Summ., at 1 (Oct. 2003), ("2003 FTC IP Report"), available at <http://ftc.gov/os/2003/10/innovationrpt.pdf>.

Two areas of patent law beyond patent quality impact how well the patent system and competition policy work together to further their common goal of enhancing consumer welfare. The first is notice – how well a patent informs the public of what technology is protected. The second is remedies – judicially awarded damages and injunctions following a court finding of patent infringement. The impact of notice and remedies on the alignment of the patent system with competition policy results from the operation of relevant legal rules and practices on competition among patented technologies.

A patent does not necessarily confer market power because patented inventions often compete with alternative technologies. Patentees can earn rewards in the market by selling a patented product themselves or by licensing the patent for others to practice. In either case, the market reward earned by the patentee, and the economic value of the invention, will depend upon the extent to which consumers prefer the patented technology over alternatives. A patent covering a highly valued, disruptive technology can confer market power and generate significant market rewards. More often, competition from acceptable alternatives will limit the market reward that a patent owner receives.

Competition among patented technologies at every stage of the innovation process helps generate lower prices, more choices and higher quality products for consumers. Products compete to be purchased by consumers. Developed technologies compete in technology markets to be chosen for incorporation into products. Early-stage technologies compete for development funding. By aligning the patentee's market reward with consumer preferences, competition in product and technology markets encourages investment in those inventions that are more likely to be valued by consumers. When patent law facilitates and does not distort this competition, it aligns with competition policy to the benefit of consumers.

FTC Hearings on the Evolving IP Marketplace

To explore the interplay of notice, remedies, innovation and competition, the FTC held eight days of hearings beginning December 2008. In addition, the FTC cosponsored a workshop with the Patent and Trademark Office (PTO) and the Department of Justice in May 2010, on the intersection of patent policy and competition policy. The hearings and workshop involved more than 140 participants, including business representatives from large and small firms, start-ups and the independent inventor community, leading patent practitioners, economists, and patent law scholars. The FTC also received over 50 written submissions.³ This report is based on testimony, written submissions and independent research.

The report begins by examining the role of technology markets and patent markets in innovation today. Those roles have evolved in recent years in ways that heighten the importance of patent notice and remedies to competition among technologies. As Chapter 1 discusses, collaboration and technology transfer have become increasingly important pathways to

³Appendices C-E list participants, comments received and topics examined at the hearings and workshop. Transcripts and written submissions are available at <http://www.ftc.gov/bc/workshops/ipmarketplace/>.

innovation with significant benefits for consumers. Patents play an important role in supporting these technology markets, and undermining that role would harm innovation. At the same time, as described in Chapter 2, we see increasing activity and complexity of business models in markets for patents that do not involve technology transfer. In these markets, patents are bought, sold and licensed as assets whose value is based on their ability to extract rents from manufacturers already using the patented technology. This activity risks distorting competition among technologies and deterring innovation, especially when driven by poor patent notice and remedies that do not align with the economic value of the patented invention. Chapters 3 through 8 make recommendations for adjustments to the legal rules and practices governing notice and remedies to better align them with competition policy without undermining patent law's support for innovation.

How Patent Notice Affects Innovation and Competition

Clear notice of what a patent covers can increase innovation by encouraging collaboration, technology transfer and design-around. Clearly defined patent rights can help companies identify and license technology they wish to develop or adopt. Poor patent notice can undermine the patent system's ability to fulfill this role, however. Potential collaborators or licensees may not find relevant patents, or they may hesitate to invest in technology when the scope of patent protection is unclear.

Notice affects competition among technologies at every stage of the R&D process. The ability to identify and assess the scope of relevant patents at an early stage can be critical for firms considering making investments in developing and commercializing an innovative product. They may unnecessarily elect not to pursue a R&D effort when the scope of coverage is unclear if they fear that another firm has blocking patents. Such decisions deter and lessen innovation and competition among technologies that might otherwise have been created. Poor patent notice also hinders competition by forcing firms to design products with incomplete knowledge of the cost and availability of different technologies. Technologies compete to be incorporated into products. But that competition is distorted if designers cannot discern in advance which technologies carry the cost of patent royalties and negotiate those royalties before they incur sunk costs based on the patented technology.

When firms choose technologies and market products despite an uncertain patent landscape, they risk post-launch patent assertions and litigation. As described in Chapters 2 and 3, resolving these claims often involves expensive litigation, which diverts resources and disrupts business operations. If the firm pays royalties, costs may increase and consumers may be deprived of the full benefit of competition among technologies.

Firms can invest in patent clearance activities – attempts to identify patents that might read on their planned activities – to reduce uncertainty and avoid later infringement allegations. Such efforts are often expensive. In the information technology (IT) industries, where products consist of many components covered by numerous patents, firms may not reliably identify all relevant patents. When they do identify patent risks, firms may unnecessarily design around

those risks or take a license due to unclear patent scope. To the extent that patent clearance and product design are made more expensive by poor notice, they impose unnecessary costs.

As discussed in Chapter 3, a firm attempting patent clearance must undertake three activities. One is claim interpretation. To fulfill their notice function, patent claims must clearly delineate the scope of patent rights. A second is predicting what claims might emerge from pending patent applications. A third is identifying potentially relevant patents or applications. Effective patent notice supporting each one of these activities implicates multiple legal rules and practices, including claim interpretation, specification requirements and application examination. Chapter 3 examines those rules and practices and makes recommendations for improving patent notice. Doing so would better align patent law and competition policy by allowing competition among technologies to function more effectively.

How Patent Remedies Affect Innovation and Competition

Effective patent remedies are critical to the patent system's incentives to innovate. Patent infringement interferes with a patentee's ability to realize its patent's value in the marketplace. Remedies protect the ability of patentees to earn returns in the market by stopping and deterring infringement in the case of injunctions, and by making patentees whole through damage awards when infringement has occurred. As explained in Chapter 4, to perform that role, patent remedies should seek to replicate the market reward that the patent holder would have earned absent infringement.

Compensatory damage awards that either under or overcompensate patentees for infringement compared to the market can have detrimental effects on innovation and competition. Undercompensation can undermine the patent system's incentives to innovate. This could impair investment in R&D and result in fewer new, innovative products and services. Damage awards that exceed what the invention could have earned absent infringement when competing with alternatives can lead to higher prices. Consumers are effectively deprived of the benefit of competition among technologies. Overcompensation can also encourage speculation in patent rights and litigation. As discussed in Chapter 2, this can deter innovation by raising the costs and increasing the risks of investment. Moreover, damages law that systematically overcompensates certain types of inventions can over-incentivize invention and patenting in that field. This outcome can disrupt the market's ability to allocate R&D resources to those areas most likely to generate the products most valued by consumers.

Calculating patent damages that replicate the market reward for the invention by constructing the world but for infringement can be a very difficult task for litigants and factfinders. Over the years, courts have developed an extensive jurisprudence surrounding the calculation of patent damages. While the fundamental principles of damages law are sound, some legal rules and practices are not well-grounded in economic analysis. For instance, some rules do not reflect a full appreciation of the appropriate role of competition from non-infringing alternatives in determining patent damages. Trial practice has allowed ill-supported damages testimony into evidence. Chapters 4 through 7 develop an economically grounded approach to

calculating patent damages and recommend changes to better align patent law and competition policy by producing damage awards that more closely replicate the market value of the invention.

Permanent injunctions prohibiting future infringement play a critical role in protecting the exclusivity that allows a patentee to reap the market reward for its invention. Following a finding of infringement, an injunction preserves the patentee's exclusivity going forward. Just as importantly, the threat of an injunction creates a significant deterrent to infringement, which allows patentees to obtain the full market reward for the invention, supported by an exclusive market position, without costly litigation.

Under some circumstances, however, the threat of an injunction can lead an infringer to pay higher royalties than the patentee could have obtained in a competitive technology market. At the time a manufacturer faces an infringement allegation, switching to an alternative technology may be very expensive if it has sunk costs in production using the patented technology. That may be true even if choosing the alternative earlier would have entailed little additional cost. If so, the patentee can use the threat of an injunction to obtain royalties covering not only the market value of the patented invention, but also a portion of the costs that the infringer would incur if it were enjoined and had to switch. This higher royalty based on switching costs is called the "hold-up" value of the patent. Patent hold-up can overcompensate patentees, raise prices to consumers who lose the benefits of competition among technologies, and deter innovation by manufacturers facing the risk of hold-up.

One challenge for injunction analysis is to protect the critical importance of patent exclusivity for innovation while recognizing that, in some instances, patent hold-up can undermine innovation and harm consumers. Chapter 8 proposes an approach that balances these concerns within the equitable analysis required by *eBay v. MercExchange*.⁴ The proposed approach aligns patent law and competition policy by preventing hold-up based on sunk costs when innovation would not be harmed.

⁴*eBay, Inc. v. MercExchange, LLC*, 547 U.S. 388 (2006).

EXECUTIVE SUMMARY

CHAPTER 1

EVOLVING PATHWAYS OF INNOVATION: OPEN INNOVATION, TECHNOLOGY TRANSFER AND EX ANTE PATENT TRANSACTIONS

Understanding what changes to the law of patent notice and remedies would increase innovation and better align the patent system and competition policy requires that we first examine how the pathways to innovation and the role of patents in promoting innovation have evolved. In one significant change, many firms have increasingly embraced “open innovation.” In a traditional or closed model of innovation, a firm relies on its own research and development (R&D) to create the products it markets. But a firm that pursues an open innovation strategy recognizes that valuable ideas can originate with others and seeks to acquire those inventions that fit its business model. Many of the inventions acquired and commercialized by large firms originated with start-ups and small companies, which have accounted for a steadily increasing percentage of R&D spending over the past 30 years.

Consumers benefit from open innovation strategies. The growth of technology transfer has permitted a division of labor to emerge between those who invent and those who manufacture most efficiently. This division of labor speeds up the rate of innovation and results in broader, faster distribution of new products to consumers. By providing a pathway for invention without commercialization, technology transfer also lowers barriers to entry for inventors who do not have access to the capital required to build manufacturing facilities and establish distribution channels. Easier entry supports additional sources of invention, which increases competition among technologies to be further developed and incorporated into products. That competition benefits consumers by generating better, cheaper products. Moreover, competition among early-stage technologies for development funding is an important mechanism for allocating scarce resources to those inventions having the greatest chance of generating the products most valued by consumers.

The patent system facilitates open innovation and technology transfer in ways that implicate patent quality, patent remedies and the notice function. The exclusive patent right creates incentives for sellers of technology to invent, and for buyers of technology to purchase and invest in further development. But the nature and effectiveness of the exclusive patent right depend in part on the remedies available for its infringement. Damages must make a patent owner whole or infringement will undermine the patent system’s incentives to innovate. Permanent injunctions must deter infringement and protect the exclusivity. Good notice of patent rights encourages investment in new technologies. But poor quality patents can discourage innovation by creating uncertainty and raising costs.

Patents also facilitate open innovation and technology transfer by creating rights based on intangible concepts, which makes contracting easier and helps create a market for ideas. In a technology transfer agreement, patents often define the rights to be transferred. Thus, patent transactions (licensing or sales) form the basis of many technology transfer agreements. Patent transactions that occur as part of a technology transfer agreement can be considered ex ante

because they occur *before* the purchaser has obtained the technology through other means. Such ex ante patent transactions accompanied by technology transfer are an important means for advancing innovation, creating wealth, and increasing competition among technologies.

CHAPTER 2

THE EVOLVING PATENT MARKETPLACE: EX POST PATENT TRANSACTIONS

While the open innovation model and technology transfer are important pathways to innovation, not all patent licensing and sales occur ex ante as part of a technology transfer agreement. In many cases, the licensee or purchaser already uses the patented technology when approached by the patent owner, but it lacks a license to use the technology. These patent transactions occur ex post, *after* the firm accused of infringement has invested in creating, developing or commercializing the technology. The firm needs the ex post license to avoid liability, even if it invented or obtained the technology independent of the patentee, because patent infringement is a strict liability offense.

The ability of patentees to assert their patents against infringers is important to the patent system's role in promoting innovation and facilitating technology transfer. The threat of a patent infringement suit deters infringement and safeguards the exclusivity that is the heart of the patent system. A business model based on invention followed by technology transfer will only succeed if a firm can prevent copying and recoup its investment in R&D.

But ex post licensing to manufacturers that sell products developed or obtained independently of the patentee can distort competition in technology markets and deter innovation. The failure of the patentee and manufacturer to license ex ante with technology transfer results in duplicated R&D effort. When a manufacturer chooses technology for a product design without knowledge of a later-asserted patent, it makes that choice without important cost information, which deprives consumers of the benefits of competition in the technology market. If the manufacturer has sunk costs into using the technology, the patentee can use that investment as negotiating leverage for a higher royalty than the patented technology could have commanded ex ante, when competing with alternatives. The increased uncertainty and higher costs associated with ex post licensing can deter innovation by manufacturers.

Increasing activity by patent assertion entities (PAEs)⁵ in the information technology (IT) industry has amplified concerns about the effects of ex post patent transactions on innovation and competition. The business model of PAEs focuses on purchasing and asserting patents against manufacturers already using the technology, rather than developing and transferring technology.

⁵This report uses the term “patent assertion entity” rather than the more common “non-practicing entity” (NPE) to refer to firms whose business model primarily focuses on purchasing and asserting patents. Taken literally, the term NPE encompasses patent owners that primarily seek to develop and transfer technology, such as universities and semiconductor design houses. Patent assertion entities do not include this latter group.

Some argue that PAEs encourage innovation by compensating inventors, but this argument ignores the fact that invention is only the first step in a long process of innovation. Even if PAEs arguably encourage invention, they can deter innovation by raising costs and risks without making a technological contribution.

The clear benefits for innovation and competition stemming from ex ante patent transactions contrast with the detrimental and ambiguous effects of ex post transactions. An important goal in aligning the patent system and competition policy is to facilitate ex ante transactions while making ex post transactions less necessary or frequent.

Improving the notice function of patents would help with both. Manufacturers often license ex post because they were not aware of the patent ex ante. Multiple factors can contribute to notice failure, including overbroad, vague claims, the large number of patents potentially relevant to IT products, and the pendency of patent applications in the Patent and Trademark Office (PTO). More clearly defined patent rights could help companies better find and license technology they wish to develop ex ante, which would support technology transfer. Better notice could also help companies obtain licenses or design around patents in advance of marketing a product, thereby decreasing the amount of ex post licensing.

Remedies law requires a careful balance to accomplish the goal of facilitating ex ante transactions while reducing the frequency of ex post transactions. On the one hand, any adjustments to remedies law must be careful not to undermine the patent system's incentives to innovate. On the other hand, if remedies overcompensate patent owners compared to the market reward absent infringement, they can distort competition and encourage patent speculation. Improvements in both notice and remedies law, as discussed in the following sections, can better align the patent system with competition policy and balance these concerns.

CHAPTER 3

PATENT NOTICE: A COMPETITION PERSPECTIVE

The Nature and Sources of Notice Problems

The hearings examined three principal notice challenges, listed below. Numerous IT panelists indicated that notice problems were substantial, often leading firms to abandon patent "clearance" efforts. In contrast, panelists from the pharmaceutical and biotech sectors generally found patent notice sufficient for effective, albeit sometimes costly, clearance searches.

Difficulty interpreting the boundaries of issued claims. To fulfill their notice function, patent claims must delineate the scope of patent rights with sufficient clarity that a person skilled in the relevant art can reliably determine whether planned activities would infringe. The hearings explored several interrelated sources of ambiguity or uncertainty:

- Language is inherently imprecise.
- Some art areas, such as software, lack clear nomenclature and common vocabularies for claiming.
- Claiming using functional language, which describes what the invention does rather than what it is, can produce abstract, ambiguous claims.
- Some applicants may have incentives to draft ambiguous claims that might be viewed narrowly by the PTO and then construed broadly in litigation.
- PTO examination often focuses on issues of novelty and nonobviousness and may result in deferring clarification of claim boundaries until litigation.

Claims that may issue from pending applications. Because products can infringe subsequently issued patents, an effective clearance search should include pending applications. A requirement that most applications be published 18 months after filing provides a partial solution. However, applications can be amended during examination, provided that there is sufficient support in the specification. Adequacy of notice depends on whether the application is published and the extent to which the specification enables third parties to foresee the claims that may emerge.

Difficulty of identifying and reviewing published patents. IT panelists described the difficulty in performing patent clearance that results from the sheer number of relevant patents, potentially numbering in the thousands. They explained that IT products typically contain many different components, each of which may be covered by numerous patents. They also reported that reliably identifying all patents that might be asserted was undermined by the lack of predictable vocabulary and frustrated by short product cycles. Panelists from other industries generally found clearance searches manageable.

Guideposts and Trade-offs

We examine possible notice enhancements with several guideposts in mind. Cost is obviously important. Often, patent applicants are best positioned to supply low-cost, but very valuable, information. Timing is another key consideration. Notice is more beneficial to third parties when they are still planning their R&D strategies and before they make sunk investments that may expose them to hold-up. Accordingly, many of the suggested improvements look to the examination process, rather than to litigation.

Trade-offs between notice and scope pose particularly thorny issues, and it is vital that they be approached with a full understanding of the notice implications. Divergence in the extent and nature of notice problems among industries also poses challenges. We look for ways to improve notice in problem areas without impairing the patent system elsewhere and without sacrificing the benefits of a unitary patent system, with doctrines applicable across technologies.

Improving the Ability to Understand Existing Claims: Indefiniteness

Under Section 112, second paragraph of the Patent Act, 35 U.S.C. § 112, claims must “particularly point[] out and distinctly claim[] the subject matter which the applicant regards as

his invention.” Otherwise, the claims are invalid on grounds of “indefiniteness.” An indefiniteness standard that weeds out claims reasonably susceptible to multiple interpretations could reduce ambiguity and improve notice in a broad range of settings.

PTO review. The Federal Circuit requires that claims be “insolubly ambiguous” to be invalid as indefinite.⁶ The PTO Board of Patent Appeals and Interferences has adopted a lower threshold of ambiguity, however, by ruling that a claim may be indefinite if it is “amenable to two or more plausible claim constructions.”⁷ *Miyazaki* approaches indefiniteness with a focus on notice. In contrast, the “insolubly ambiguous” standard accepts substantial ambiguity. It preserves claims that require a court to make hard choices among varying interpretations, thereby overstating what marketplace participants are likely to understand. The *Miyazaki* approach is preferable when implemented during PTO review. In the PTO, indefiniteness rulings promptly add clarity and require only a claim amendment from the applicant.

Recommendation. In assessing indefiniteness, the PTO should adhere to the principle articulated in *Miyazaki*.

Functional claims. The Federal Circuit has also recognized notice concerns in recent rulings finding computer-implemented means-plus-function claims indefinite.⁸ In each case, the invalidated claims covered a function implemented by means of a computer or microprocessor, but the specification provided no details regarding the relevant program. The court ruled that without disclosing in the specification some form of algorithm for performing the claimed function – not necessarily anything highly detailed – the applicant had not satisfied definiteness requirements. This presents a helpful opportunity to enhance notice regarding software patents, but the reach of the “algorithm” requirement is still uncertain. The rulings also point the way toward steps that would add clarity to functional claims that fall outside the means-plus-function format.

Recommendation. The Commission recommends that courts give weight to notice objectives as they further explicate the circumstances in which a patent’s specification sufficiently supports a means-plus-function claim. Those objectives require sufficiently detailed structure to inform the public of the means that fall within and outside of the claim’s scope. Similar concerns apply more broadly, and the Commission urges that courts extend their recent focus on indefiniteness to address functional claiming in general.

⁶Exxon Research & Eng’g Co. v. United States, 265 F.3d 1371, 1375 (Fed. Cir. 2001).

⁷Ex Parte Miyazaki, 89 U.S.P.Q. 2d 1207, 2008 WL 5105055, at *5-6 (Bd. Pat. App. & Interf. Nov. 19, 2008).

⁸Finisar Corp. v. DirecTV Group, Inc., 523 F.3d 1323, 1340 (Fed. Cir. 2008); Aristocrat Techs. Australia Pty, Ltd., v. Int’l Game Tech., 521 F.3d 1328, 1338 (Fed. Cir. 2008).

Improving the Ability to Understand Existing Claims: Enhancing the Value of the Specification for Claim Construction

Claim construction raises a set of issues with profound notice implications. Claims are interpreted “in light of the patent specification,” but this principle often leaves significant ambiguity regarding claim coverage. Hearing testimony focused on enhancing the value of the specification for claim construction through more stringent enforcement of Section 112, at least in the IT industry, and by defining claim terms.

Enforcement of 35 U.S.C. § 112, ¶ 1. Panelists stressed the importance of calibrating claim scope to the specification for predictable claim construction and effective public notice. As claims extend farther beyond the invention expressly described in the specification, their boundaries become more ambiguous. Patent law achieves that calibration through two requirements recited in 35 U.S.C. § 112, the written description requirement and the enablement requirement.⁹ There was considerable testimony, however, that the written description and enablement requirements have been much less stringently enforced in IT industries than elsewhere, leading to concerns over ambiguous scope. The hearings suggested several ways to address this issue.

Whether a specification sufficiently supports a patent’s claims under Section 112 is assessed through the eyes of the hypothetical “person having ordinary skill in the art,” or PHOSITA. What the PHOSITA is likely to understand or find demonstrated is a reasonable proxy for what third parties are likely to perceive. Some analysts have argued that, at least for Section 112 purposes, the level of skill attributable to the PHOSITA has been set too high in IT contexts and too low in biotech settings. Attributing too high a skill level to the IT PHOSITA could unduly reduce disclosure requirements for the specification, allow broad, ambiguous claims, and raise serious notice concerns. To ensure adequate notice, the level of skill ascribed to the PHOSITA must reflect facts and avoid inappropriate rules of thumb.

Recommendation. The Commission urges courts to direct heightened attention and provide additional guidance regarding assessment of PHOSITA skill levels relative to the problems posed by the art. To serve notice goals, application of the PHOSITA standard should be fact-based, up-to-date, and appropriately tailored to the specific technology at hand.

A second problem derives from the requirement that the specification enable third parties to make or use the invention without “undue” experimentation. From the perspective of competitive impact, time-consuming experimentation is more likely to be undue in settings where product life-cycles are measured in months than where they are measured by decades.

⁹The specification must (1) describe the invention sufficiently to convey to a person having skill in the art that the patentee/applicant was in possession of the claimed invention at the time the application was filed, and (2) enable third parties to make or use the invention without undue experimentation.

However, the factors traditionally considered in evaluating “undue experimentation” omit this commercial perspective.

Recommendation. Determinations regarding whether a disclosure requires undue experimentation should give recognition to the competitive significance of the time required for experimentation; when product life-cycles are short, greater disclosures may be needed in order to be competitively meaningful.

Defining claim terms. One concern raised repeatedly during the hearings was that claims frequently use terms with no apparent definition in the specification. Litigants disputing claim interpretation may turn to different dictionaries to find a favorable definition. The problem is exacerbated for fast-moving technologies lacking widely-accepted terminology. Notice would be improved through undisputed claim term definitions.

Recommendation. The Commission recommends that patent applicants be required either (i) to designate a dictionary for use in assigning meaning to terms not defined in the application or (ii) to acknowledge acceptance of a PTO-designated default dictionary for that purpose. The PTO-designated default dictionary could vary by art unit.

Recommendation. The Commission urges the PTO to continue to look for ways to press patent applicants to include definitions or contextual explanations of key terms. Mechanisms that could accomplish this include (i) requiring applicants to provide a glossary defining any key terms that are not covered by a designated or default dictionary or that the applicant chooses to define differently than in such a dictionary or (ii) requiring that applicants include key claim terms in the specification and provide a ready means for identifying where they appear.

Recommendation. The Commission urges that the PTO convene a government/industry task force or hold a workshop to explore ways of fostering greater uniformity in the methodology or language used for describing and claiming software inventions.

Improving the Ability to Understand Existing Claims: Enhancing the Value of the Prosecution History for Claim Construction

In addition to the language of the patent itself, important evidence relevant to a claim’s meaning may appear in the prosecution history. Panelists registered considerable support for increasing and recording exchanges between examiners and applicants pertinent to patent scope. They explained that engaging the applicant in ways that build a prosecution history record

enables all participants in the patent system to better understand claim boundaries. The PTO very recently has exhorted its examiners to take steps in these directions.¹⁰

Recommendation. The Commission urges that examiners be further encouraged to build a record that improves claim scope clarity. In part, this may be achieved through greater focus on Section 112 standards. Additional notice may be derived via indefiniteness rejections or interviews tailored to elicit information from applicants regarding the meaning of their claims. Beyond this, the Commission reiterates the recommendation in its 2003 IP Report¹¹ for “a concentrated effort to use examiner inquiries [under PTO Rule 105] more often and more extensively,” as a means, for present purposes, of increasing and recording examiner/applicant exchanges pertinent to patent scope.

Recommendation. The Commission recommends that the PTO continue to encourage examiners to make greater and more informative use of statements of reasons for allowance and for withdrawing indefiniteness rejections and that courts accord such statements due weight as prosecution history relevant to claim interpretation.

Improving the Ability to Foresee Evolving Claims

Adequate notice requires both knowledge of those patent applications pending in the PTO that might issue with relevant claims and an ability to foresee the evolving claims that could issue as a result of prosecution. Knowledge of the applications comes through their publication. The ability to foresee claims depends on enforcement of the Section 112 requirements. The amount of time an application remains pending in the PTO also affects notice.

Publication of applications. Until a patent application is available to public view, third parties have no opportunity to determine whether they have freedom to operate. Under current law, most U.S. patent applications are published 18 months after filing. For applications filed only domestically, however, the applicant may keep the application secret until the patent issues. Hearing testimony described unpublished applications as a threat to expensive R&D, although independent inventors feared publication would allow large companies to appropriate their inventions.

Recommendation. The Commission recommends legislation requiring publication of patent applications 18 months after filing, whether or not the applicant also has sought patent protection abroad (subject to possible adjustments to provide any necessary protection to independent inventors). This

¹⁰See USPTO, *Supplementary Examination Guidelines for Determining Compliance with 35 U.S.C. 112*, 76 Fed. Reg. 7,162 (Feb. 9, 2011).

¹¹2003 FTC IP Report, ch. 5, at 13-14.

recommendation is consistent with that made in the 2003 FTC IP Report, which noted the “benefits of publication to business certainty and the potential competitive harms and hold-up opportunities that flow from unanticipated ‘submarine’ patents.”¹²

Section 112 requirements. Once an application is published, third parties have notice of the specification and pending claims. However, a patent applicant can amend and add new claims during prosecution. The ability of third parties to foresee evolving claims depends on the extent to which the specification provides effective notice of the range of claims that ultimately might issue. The disclosure requirements of Section 112 (written description and enablement) provide protection against undue broadening of claims through additions and amendments.

Panelists from the IT industry expressed concern about how well these protections allow them to foresee claims that might issue. One reason is the perceived lax enforcement of the Section 112 requirements for IT patents. Another reason is the nature of the written description requirement, which, traditionally, has not focused on precisely the right question for notice purposes. Thus, it uses an already written claim to evaluate the sufficiency of the specification. But it does not ask whether the specification allows the PHOSITA to predict what might be claimed as within the scope of the invention. Enablement analysis presents a similar problem. Unless a manufacturer can predict when making R&D investments that patent claims covering its product could emerge, the broadened claims reach beyond the application’s effective notice.

A breakdown of notice regarding evolving claims can have important competitive consequences. In its 1988 *Kingsdown* decision, the Federal Circuit declared that it is not “in any manner improper to amend or insert claims intended to cover a competitor’s product the applicant’s attorney has learned about during the prosecution of a patent application,” provided the claims are adequately supported by the original disclosure.¹³ If the competitor could not have predicted those claims, application of the *Kingsdown* doctrine subjects its innovation to unexpected infringement liability. That result impairs the competitive efforts of rivals and undermines the patent system’s goal of fostering innovation.

Recommendation. The Commission recommends that consideration of the PHOSITA’s ability to foresee future evolution of the claims be more fully incorporated into application of the written description requirement; the applicant should not be understood to have been in possession of the subject matter of a new or amended claim of scope broader than what the PHOSITA, on the filing date, could reasonably be expected to foresee from the specification.

Continuation practices. Another way of addressing some of these issues would be to limit infringement exposure when claims have been broadened using continuations.

¹²*Id.* at 15.

¹³*Kingsdown Med. Consultants, Ltd. v. Hollister, Inc.*, 863 F.2d 867, 874 (Fed. Cir. 1988).

Continuation applications enable an applicant to extend the prosecution period, potentially for many years, while maintaining the benefit of the initial filing date. So long as the original application's specification contains adequate support for any claim additions or amendments, continuation practice provides a means to broaden coverage of the application's claims.

Continuations are not the source of the notice problem regarding evolving claims, and they often serve important, entirely legitimate needs. They do, however, extend the period of new-claim gestation and thereby raise third-party exposure to opportunistic conduct that takes advantage of intervening market commitments, such as the conduct sanctioned in *Kingsdown*. A targeted limitation on enforcement of broadened continuation claims could limit the potential competitive harm.

Recommendation. The Commission recommends enactment of legislation to protect from infringement actions third parties who (i) infringe properly described claims only because of claim amendments (or new claims) following a continuation and (ii) developed, used, or made substantial preparation for using, the relevant product or process before the amended (or newly added) claims were published.¹⁴

PTO funding. Finally, a crucial predicate for this discussion is an ongoing examination process. Unfortunately, the PTO currently suffers under a huge application backlog. Delay in commencing the examination procedures that begin to add clarity and in issuing patents only adds to the period of uncertainty.

Recommendation. The Commission recommends that the PTO receive the funding and information systems needed to promptly and properly examine the many applications that it faces.

Improving the Ability to Sift Through a Multitude of Patents

Identifying and reviewing the patents and applications that might conceivably apply to a new product often present daunting challenges in IT industries. In addition to the sheer number of patents, testimony emphasized that unclear claim language and the diverse ways in which claims might be expressed make search less effective. The hearings considered three ways to address these issues.

Improving clearance search. The PTO provides public access to paper and electronic files of patents, but organizes them under a system that differs from industry-based classifications. Moreover, particularly in software contexts, researchers and applicants may describe the same invention using different words, undermining reliable search.

¹⁴The Commission first made this recommendation at 2003 FTC IP Report, ch. 4, at 31.

Recommendation. The Commission recommends that the PTO instruct examiners to classify patents using an industry-based classification system, as well as the PTO classification system, in art units where the additional classifications would significantly improve public notice. The Commission further recommends that the PTO explore mechanisms for encouraging examiners to compile search-friendly lists of descriptive terms for applications under review and patents ready for issuance.

Recommendation. The Commission urges that the PTO explore with the software industry whether ways might be devised to foster greater uniformity in the methodology or language used for describing and claiming inventions, as a means of enhancing search capabilities.

Identifying patent assignees. Potential users of a technology need a ready means of identifying the current owner of a patent. One strategy for navigating an environment with many potentially relevant patents is to concentrate clearance efforts on patents held by competitors or others who are likely to sue. This strategy falters if the public cannot identify current owners. Panelists reported that under current law parties often fail to record assignments or list “shell companies” as assignees. A patent confers a right to exclude, and it is important to clearance efforts that the public faced with that right have a ready means of identifying the owner.

Recommendation. The Commission recommends the enactment of legislation requiring the public recordation of assignments of patents and published patent applications. To ensure that such listings provide maximum benefit to public notice, they should identify both the formal assignee and the real party in interest.

Modifying liability for inadvertent infringement. The consequences of notice failures are particularly harsh because infringers are held liable even if they have no knowledge of the patent. Recent studies show that patent infringement litigation often seeks recovery from such “inadvertent infringers.” If efforts to improve notice do not succeed, consideration of modifications to strict liability – such as prior user rights or an “independent invention” defense – may be appropriate. But a substantial change along these lines could result in a dramatically different patent system, and knowledge in this area is limited. Under these circumstances, research designed to better understand how modifications to strict liability for patent infringement would affect incentives to invent and innovate would be desirable.

CHAPTER 4 **THE ECONOMIC AND LEGAL FOUNDATIONS OF PATENT REMEDIES**

The Patent Act incorporates the fundamental goal of fully compensating patentees for infringement by requiring that a court award a successful patentee damages “adequate to compensate for the infringement.” Courts have defined damages “adequate to compensate” as those that make the patent owner whole by placing it in the position it would have been but for the infringement. This standard aligns patent law and competition policy by replicating the

market reward for the invention, meaning the amount the patentee would have earned in the absence of infringement by either selling a patented product or by licensing the patented technology.

Courts have developed an extensive jurisprudence on how to calculate compensatory damages. Current law identifies two categories of patent damages – lost profits and reasonable royalties – and provides legal rules for determining which category applies and how damages should be calculated. Calculating accurate damages is a difficult task, however. The calculation is based on a hypothetical world of no infringement but continued competition from non-infringing alternatives. Undercompensation can harm consumers by decreasing incentives to innovate. Overcompensation can also hinder innovation and deprive consumers of the benefits of competition in multiple ways. To address these concerns, this report seeks to derive an economically grounded approach to calculating patent damages and to test the current legal rules for calculating damages against that approach.

CHAPTER 5 **LOST PROFITS DAMAGES**

When a patentee commercializes the invention itself, its market reward is measured by the profits it earns. In this context, infringement generally entails making and selling a competing product containing the patented technology. Infringing competition can reduce a patentee's profits in a number of ways, including by diverting sales from the patentee's product, eroding the patentee's sales price, and causing the patentee to lose collateral sales of nonpatented products.

Recommendation. In assessing how the market would have rewarded the invention absent infringement, courts should allow a patentee flexibility in creating the “but for” world to address different losses and avoid undercompensation. Patentees should not be denied an opportunity to establish lost profits through application of rigid rules that do not reflect sound economic principles or imposition of evidentiary requirements beyond what is required for the court to make a reasonable approximation of the patentee’s loss.

Non-infringing Alternatives in a Lost Profits Calculation

It is also important that the legal rules recognize how alternatives to the patented invention would have affected the patentee’s profits. In the world absent infringement, the infringer might have sold an alternative to the patented technology. Accurately calculating damages in the face of that competition requires an examination of consumer preferences for the patented invention over alternatives. The more consumers prefer the patented invention, the greater the number of sales that infringement causes the patentee to lose. When consumers freely substitute alternatives for the patented product, infringement causes fewer lost sales. Economic tools, including those frequently used in antitrust analysis, can help determine the number of lost sales.

Two current legal rules fail to give proper consideration to the role of alternatives in determining lost profits damages: the entire market value rule and the practice of making dual awards of lost profits and reasonable royalty damages.

The entire market value rule. When a patented invention is only one component of a larger product, the “entire market value rule” awards lost profits damages based on the entire value of the patented product if (1) the patented feature is “the basis for customer demand” of the infringing product and (2) the patented and unpatented components together “constitute a functional unit.”¹⁵ The entire market value rule distracts litigants and factfinders from a careful reconstruction of a market lacking infringement. Proper consideration of the “degrees of substitutability” among products is eliminated under the all or nothing “basis for customer demand” test. The “functional unit” prong introduces an irrelevant consideration into the analysis. A more nuanced economic analysis would seek to determine the number of consumers that would choose an alternative if the infringing product were not available. Under this economic analysis, the infringer’s sales are effectively “apportioned” according to the value that the invention imparts to the entire product.

Recommendation. Courts should reject the entire market value rule as a basis for awarding a patentee lost profits damages based on all infringing sales and instead require proof of the degree of consumer preference for the patented invention over alternatives.

Dual awards. Courts have awarded lost profits damages on a portion of the infringing sales while also awarding reasonable royalty damages on the remaining infringing sales. Such dual awards can give more than required to put the patentee in the position it would have been but for the infringement. When an analysis of consumer preferences shows that, absent infringement, some consumers would have purchased an alternative to the patented product, giving the patentee reasonable royalty damages on those sales overcompensates it.

Recommendation. Courts should reject dual awards of lost profits and reasonable royalty damages when competition from alternatives would have prevented the patentee from making all the infringer’s sales in a world of no infringement.

CHAPTER 6 **THE HYPOTHETICAL NEGOTIATION IN REASONABLE ROYALTY DAMAGES**

When a patentee does not market its invention, it can instead earn the market reward for the patent through licensing. For this reason, when a patentee cannot or chooses not to prove lost profits from infringement, the measure of damages is the amount that the patentee would have received in the market for licensing the patented technology. Patent law appropriately implements this concept by awarding reasonable royalty damages based on what a willing

¹⁵Rite-Hite Corp. v. Kelly Co., 56 F.3d 1538, 1550 (Fed. Cir. 1995) (en banc).

licensor and willing licensee would have agreed to in a hypothetical negotiation, assuming the patent is valid and infringed. In an actual negotiation and, therefore, a hypothetical negotiation, the maximum amount a licensee would pay depends upon the economic value of the patented invention, meaning the incremental value of the invention compared to alternatives.

Concerns with the Hypothetical Negotiation Framework

Its counterfactual nature. Courts have, in some instances, allowed reasonable royalty damage awards that appear to be more than a hypothetical negotiation would have produced. In doing so, they have implicitly or explicitly rejected the central premise that the award must be consistent with what a willing licensee would pay for the patented technology. Many cases suggest unease with the hypothetical negotiation due to its counterfactual assumption that the infringer never infringed and the parties reached agreement. Underlying this unease is often a concern that the maximum royalty the infringer would have been willing to pay could not adequately compensate the patentee and would have been unacceptable to it. Some cases also contain overtones of punishing infringers.

Both concerns are inappropriate. First, compensatory damages for the strict liability offense of infringement are not meant to be punitive. Second, arguments that the patentee would have rejected the maximum amount the infringer would have paid are based on assumptions that the patentee could have made more by *not* licensing. The patentee may have been better off selling the invention or a competing product exclusively. In that case, however, the patentee should be entitled to damages based on lost profits. The law must be flexible in allowing the patentee to prove its lost profits in order to provide adequate compensation. But a patentee who has failed or chosen not to do so should not be allowed to use unproven arguments of direct losses to inflate a reasonable royalty award beyond what a willing licensee would pay.

Deterring infringement. Some cases that seem to reject the willing licensor/willing licensee model have expressed concern that the prospect of paying reasonable royalty damages supplies an insufficient deterrent to infringement and leads firms to choose to infringe by charging only the “normal” royalty. This concern ignores several other deterrents to infringement incorporated within the patent system. First, the argument incorrectly assumes that damages following trial will be the “normal” royalty. The law, however, requires that the hypothetical negotiation amount incorporate the assumption that the patent is valid and infringed, which will raise the royalty rate. In addition, enhanced damages penalize those who willfully infringe and deter copying. Finally, and perhaps most importantly, the threat of injunctive relief provides critical deterrence to infringement, as discussed more fully below.

Recommendation. The Commission recommends that courts award reasonable royalty damages consistent with the hypothetical negotiation analysis and willing licensor/willing licensee model. Concerns about punishing infringement, deterring infringement, the counterfactual nature of the analysis, or unproven lost profits that the patentee may have suffered, should not inflate the reasonable royalty damage award beyond what a willing licensee would have paid for a patent known to be valid and infringed. Doing so risks awarding patentees more

than the economic value of their inventions compared to alternatives and creating problems of overcompensation and market distortion.

CHAPTER 7

CALCULATING REASONABLE ROYALTY DAMAGES

Accurately calculating reasonable royalty damages based on a hypothetical negotiation and the willing licensor/willing licensee model presents numerous challenges for litigants and courts. An economically grounded approach to damages calculation that appreciates the role of competition in establishing the economic value of an invention would increase the accuracy of that determination. Chapter 7 suggests several steps courts can take to increase the accuracy of reasonable royalty damage awards.

The *Georgia-Pacific* Factors and Their Implementation

Courts and juries often make reasonable royalty damage awards by considering some or all of the *Georgia-Pacific* factors, a list identified by a district court in 1970 as relevant to the issue.¹⁶ This list has served as a touchstone for expert testimony, jury instructions, and judicial review of damage awards. Clarifying the appropriate role of the *Georgia-Pacific* factors would help increase the accuracy of reasonable royalty damage awards. The factors do not provide a conceptual framework for calculating damages. Rather, they are properly understood as a non-exhaustive list of evidence categories that may be, but are not necessarily, relevant to a specific calculation.

Recommendation. Courts should consistently adopt and apply the hypothetical negotiation and willing licensor/willing licensee model as the conceptual framework against which conduct of the damages trial is tested. In particular, courts should recognize that the *Georgia-Pacific* factors provide only a list of evidence categories. Implementing this recommendation will have practical consequences regarding jury instructions, admissibility of evidence and decision-making, discussed below.

The Role of Alternative Technologies

Manufacturers often choose among competing alternative technologies to incorporate into new products. A manufacturer will not pay more to use patented technology than the increased profits it anticipates from using the patented invention compared to the next best alternative. If royalties exceed this economic value of the invention, manufacturers can bargain for a lower rate or choose an alternative. Because alternative technologies play a crucial role in actual licensing negotiations, they must play a commensurate role in the hypothetical negotiation that determines

¹⁶Georgia-Pacific Corp. v. United States Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), modified and aff'd, 446 F.2d 295 (2d Cir. 1971).

reasonable royalty damages. Recent case law has suggested, however, that the availability of non-infringing alternatives does not necessarily cap reasonable royalty damage awards.

Recommendation. Courts should recognize that when it can be determined, the incremental value of the patented invention over the next-best alternative establishes the maximum amount that a willing licensee would pay in a hypothetical negotiation. Courts should not award reasonable royalty damages higher than this amount.

Timing of the hypothetical negotiation. A manufacturer's costs in choosing an alternative to the patented technology and the ability of alternatives to cap a reasonable royalty can depend on the timing of the hypothetical negotiation. As it chooses technologies to incorporate into a new product, a manufacturer will often make investments (e.g., building manufacturing facilities) based on that choice that make it more costly to switch to an alternative. If the hypothetical negotiation is deemed to take place after investments have increased switching costs, the reasonable royalty may be higher than it would have been at the time of the design choice. This result overcompensates patentees compared to the economic value of the invention because of investments by the infringer. The ability of patentees to demand and obtain royalty payments based on the infringer's switching costs is commonly called "hold-up." The case law places the hypothetical negotiation at the time infringement began, but it does not precisely define that point in time.

Recommendation. To prevent damage awards based on switching costs, courts should set the hypothetical negotiation at an early stage of product development, when the infringer is making design decisions and before it has sunk costs into using the patented technology.

Reasonable royalties applied to standards. Hold-up may have especially severe consequences for innovation and competition in the context of standardized technology. IT firms often achieve interoperability among products by working together in standard setting organizations (SSOs) to jointly adopt industry-wide technical standards. Alternative technologies compete for inclusion in the standard. Once a technology is incorporated into a standard, a firm with a patent reading on the technology can demand a royalty that reflects not only the value of the technology compared to alternatives, but also the value associated with investments made to implement the standard. Switching costs may be prohibitively high when an industry becomes locked into using standardized technology. Were patentees able to obtain the hold-up value, this overcompensation could raise prices for consumers while undermining efficient choices made among technologies competing for inclusion in a standard.

One way that many SSOs attempt to address this problem is through licensing rules that require participants to agree to license patents on RAND (Reasonable and Non-Discriminatory) terms. But panelists complained that RAND was not defined and provided little guidance in licensing negotiations. More clarity in the damages case law on the role of alternatives and timing in the hypothetical negotiation would support a definition of RAND that limits hold-up. A definition of RAND based on the ex ante value of the patented technology at the time the

standard is chosen is necessary for consumers to benefit from competition among technologies to be incorporated into the standard.

Recommendation. Courts should apply the hypothetical negotiation framework to determine reasonable royalty damages for a patent subject to a RAND commitment. Courts should cap the royalty at the incremental value of the patented technology over alternatives available at the time the standard was chosen.

Courts' Gatekeeping Role in Reasonable Royalty Damages Cases

Litigants frequently present damages evidence in patent cases to the jury through an expert witness who offers opinion on the appropriate damage award. The judge acts as a gatekeeper in determining whether that opinion testimony is sufficiently reliable to be admissible under Federal Rule of Evidence (FRE) 702. To be reliable, expert testimony must be: (1) based on sufficient facts or data; (2) the product of reliable principles and methods; and (3) result from reliable application of those principles and methods to the facts of the case.

Calls for more vigorous judicial gatekeeping excluding unreliable testimony on damages have received heightened attention in the patent community and generated broad agreement at the hearings. Such gatekeeping is especially important for achieving accurate awards in the context of the hypothetical negotiation, which can be difficult for jurors to apply. Panlists maintained, however, that courts rarely exercise their gatekeeping authority in patent damages matters. Decisions under *Daubert*¹⁷ that examine only the reliability of an expert's methodology, without fully considering whether he reliably applied that methodology to the facts of the case, can result in admission of improper testimony. The recent Federal Circuit opinion, *Uniloc v. Microsoft*,¹⁸ emphasizes the need for damages experts to tie accepted methodologies to the facts of the particular case.

Recommendation. In their gatekeeper role of enforcing FRE 702, courts should test the admissibility of expert testimony on damages by assessing whether it will reliably assist the trier of fact in determining the amount a willing licensor and willing licensee would have agreed to as compensation for use of the patented invention in the infringing product. Courts should not deem evidence as relevant, reliable and admissible solely because it falls within one of the *Georgia-Pacific* factors.

¹⁷Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579 (1993).

¹⁸Uniloc USA, Inc. v. Microsoft Corp., Nos. 2010-1035, 2010-1055, 2011 WL 9738 (Fed. Cir. Jan. 4, 2011).

Recommendation. Consistent with FRE 702, courts should require a showing that a damages expert's methodology is reliable, that he reliably applies the methodology to the facts of the case, and that the testimony is based on sufficient data. Demonstration of a reliable methodology without satisfaction of the other two prongs should not establish admissibility.

Comparable licenses and averages. The issues surrounding the admissibility of royalty rates on licenses claimed to be comparable to the hypothetically negotiated license illustrate the importance of active gatekeeping. Basing reasonable royalty awards on royalty rates in patent licenses that are “comparable” to the license that would result from the hypothetical negotiation (or averages of such royalty rates) is a common methodology for setting reasonable royalty damages. Such evidence can reliably assist the trier of fact in setting the hypothetical negotiation license only if the patented invention and its infringing use are sufficiently similar to those of the comparable license. Key attributes in assessing comparability include the technology that is licensed, the rights licensed (e.g., whether a license covers one patent or several), and the type and terms of the license (e.g., running royalty or lump sum). In *Lucent v. Gateway*¹⁹ and other cases, the Federal Circuit has recently applied a more rigorous review of damage awards that considers whether licenses offered as “comparable” are sufficiently similar to support a jury verdict.

Recommendation. Courts should admit expert testimony based on comparable licenses as reliable only upon a satisfactory showing of similarity between the licensed patent and the infringed patent, and between the non-price terms of the comparable license and hypothetical license. That showing should be sufficient to support an inference that the royalty rate for the comparable license provides a reliable indicator of the royalty that would be reached in the hypothetical negotiation.

Choosing the Royalty Base: The Entire Market Value Rule

The entire market value rule arose in the context of calculating lost profits damages for a patent covering a component of a product. The law allows the patentee to recover lost profits damages based on the entire market value of the product when the patented component is the “basis for customer demand.” Otherwise lost profits damages will be based only on the value of the patented component or “apportioned.”

The entire market value rule as developed for lost profits has no corollary in the context of calculating a royalty by multiplying a royalty base times a royalty rate. There is no amount of potential damage funds, such as the profits lost on a product, to be entirely awarded or apportioned. Moreover, the base and rate are closely interrelated. Altering the base in response to a legal test should result in recalibrating the rate. Nonetheless, courts have imported this rule into reasonable royalty determinations as a technique for identifying the royalty base.

¹⁹Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301 (Fed. Cir. 2009).

Recommendation. Courts should eliminate the entire market value rule and the question of whether the patented feature was the “basis for customer demand” from the determination of the appropriate base in a reasonable royalty damages calculation. It is irrelevant and it risks injecting significant confusion that threatens to produce inaccurate awards.

Identifying the base. Multiple considerations apart from the entire market value rule influence parties’ choice of a royalty base in actual licensing negotiations, including convenience of the parties and the practice in the industry. Where the patented invention is only one component of a larger product, the product may be the only item that is priced and can be monitored. However, the practical difficulty of identifying a royalty rate that accurately reflects the invention’s contribution to a much larger, complex product counsels toward choosing the smallest priceable component that incorporates the invention. Because the choice of a base in an actual licensing negotiation is not driven by whether the patented feature is the “basis for customer demand,” that question should not drive the choice of base in a hypothetical negotiation. (The rule’s concern with the extent to which a patented invention drives customer demand is relevant for identifying an appropriate royalty *rate*.)

Recommendation. Courts should identify as the appropriate base that which the parties would have chosen in the hypothetical negotiation as best suited for accurately valuing the invention. This may often be the smallest priceable component containing the invention.

CHAPTER 8 PERMANENT INJUNCTIONS IN PATENT CASES

In addition to awarding damages for past patent infringement, courts may also grant permanent injunctions prohibiting future infringement. In 2006, in *eBay v. MercExchange*, a unanimous Supreme Court held that the grant of permanent injunctive relief in a patent case is governed by “traditional equitable principles.” The Court listed four factors that a patentee must satisfy to obtain an injunction:

- (1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction.²⁰

²⁰*eBay, Inc. v. MercExchange, LLC*, 547 U.S. 388, 391 (2006).

How Permanent Injunctions Affect Innovation and Competition

Although the injunction analysis is equitable, to most benefit consumers, it should be conducted in a manner that furthers the patent system's goal of promoting innovation and recognizes consumer interest in aligning the patent system and competition policy. Three characteristics of injunctions that affect innovation support generally granting an injunction. The first and most fundamental is an injunction's ability to preserve the exclusivity that provides the foundation of the patent system's incentives to innovate. Second, the credible threat of an injunction deters infringement in the first place. This results from the serious consequences of an injunction for an infringer, including the loss of sunk investment. Third, a predictable injunction threat will promote licensing by the parties. Private contracting is generally preferable to a compulsory licensing regime because the parties will have better information about the appropriate terms of a license than would a court, and more flexibility in fashioning efficient agreements.

A fourth characteristic of injunctions affects the alignment of the patent system and competition policy. An injunction's ability to cause patent hold-up can support withholding injunctive relief in some situations. A manufacturer's high switching costs combined with the threat of an injunction can allow a patent owner to obtain payments unrelated to the economic value of its invention. Hold-up and the threat of hold-up can deter innovation by increasing costs and uncertainty for manufacturers. It can also raise prices to consumers by depriving them of the benefit of competition among technologies. In such circumstances, injunction law threatens to disrupt the alignment of the patent system and competition policy.

A challenge for injunction analysis is to integrate and balance awareness of these issues. Hold-up can harm innovation and competition. But denying an injunction every time an infringer's switching costs exceed the economic value of the invention would dramatically undermine the ability of a patent to deter infringement and encourage innovation. For this reason, courts should grant injunctions in the majority of cases, but criteria are needed to help identify those instances in which the harm to the patentee from ongoing infringement is small compared to the costs from hold-up. These criteria include: (1) whether the patented technology is a minor component of a complex product that would have been easy to design around ex ante; (2) whether the infringement affects the patentee's ability to compete in a product or technology market; and (3) whether the infringer copied the patented technology.

Analyzing *eBay*'s Four Factors

To be implemented by courts, these concerns about innovation and aligning the patent system and competition policy must be translated into the *eBay* framework. In fact, these concerns fit well within the equitable nature of the injunction remedy and *eBay*'s four factor analysis.

Irreparable harm/inadequacy of money damages.²¹ Much discussion concerning injunction law post-*eBay* has focused on whether the patentee and infringer compete in a product market. Conventional wisdom assumes that patentees that do not compete in a product market cannot obtain injunctions because money damages will adequately compensate any harm they may suffer from infringement. Conventional wisdom also assumes that a patent owner practicing the patent can and should be granted an injunction.

The class of non-practicing patent owners is too diverse to be subject to a simple rule. Patentees that license as part of a technology transfer program can suffer harm from infringement akin to that suffered by manufacturing patentees. These patentees compete in a technology market to have their technology purchased for incorporation into new products. The availability of an injunction is important to such patentees, who rely on the threat to deter infringement and encourage ex ante licensing. The harm suffered by these patentees as a result of infringement can be analogous to that suffered by manufacturing patentees, including loss of a customer base and harm to reputation as an innovator. However, denial of an injunction may not prevent a patent assertion entity (PAE) from receiving the full value of the invention. That patentee will not have the same concerns about deterring future infringement and protecting its reputation as an innovator that other patentees may have.

This is not to say, however, that courts should assume all manufacturing patentees will suffer irreparable harm from infringement. While that might often be the case, the analysis must consider other facts. The patent may cover a minor component of the infringing product. Competing products may include non-infringing alternatives that are acceptable to customers, making it less likely that the infringement (as opposed to competition generally) is harming the patentee. The variety and complexity of different factual scenarios caution against creating any assumptions of irreparable harm based on a finding of infringement, a patentee's use of the patent, or its willingness to license.

Recommendation. Courts should not presume irreparable harm based on a finding of infringement or the patentee's use of the patent. Conversely, courts should recognize that infringement can irreparably harm the ability of patentees that primarily engage in technology transfer through licensing to compete in a technology market.

Balance of the equities and hardships between the parties. Under this factor, courts must consider the effect of an injunction on an infringer and balance it against the harm that infringement imposes on the patentee. This factor allows courts to weigh the expense and harm to an infringer facing hold-up against the harm to the patentee by considering whether the invention is a minor component for which acceptable alternatives are available, and how infringement affects the patentee's ability to compete in a goods or technology market. Courts can also consider whether the infringer copied the technology.

²¹Courts and commentators often analyze these two factors as one. Appendix B, Section III.A.

Recommendation. Courts should consider the hardship of an infringer facing hold-up under this prong. Courts should reject the statement that an infringer “cannot be heard to complain if an injunction against continuing infringement destroys the business”²² except in those instances where an infringer “elects” to infringe by copying a patented invention with knowledge of the patent.

Public interest. Under the public interest factor, courts must examine the effect an injunction would have on third parties, including the public at large. Courts often cite the public’s interest in the patent system’s ability to promote innovation as supporting an injunction. While this is important, in some circumstances, such as those involving hold-up based on a patent for a minor component, an injunction could unduly raise prices to consumers and deter rather than promote innovation.

Recommendation. When warranted by the facts, courts should consider the public’s interest in avoiding patent hold-up, which can increase costs and deter innovation.

Injunction Analysis in the Standard Setting Context

Hold-up in the standard setting context can be particularly acute. Standards are often adopted to make products compatible and interoperable with other products in the industry. “Lock-in” can make an entire industry susceptible to hold-up. In addition to higher prices and other economic harms, hold-up in standards-based industries may discourage standard setting activities and collaboration, which can harm innovation.

eBay provides a framework for evaluating whether to issue an injunction in the standard setting context. A prior RAND commitment by the patentee or its successor-in-interest can provide evidence that denial of an injunction in favor of ongoing royalties will not irreparably harm the patentee. The infringer’s inability to participate effectively in the market without complying with the standard is relevant to the balance of hardships. The public interest factor may consider whether grant of an injunction would deprive consumers of interoperable products; raise costs above the incremental value of the invention compared to alternatives at the time the standard was set; or threaten to undermine the collaborative innovation that can result from the standard setting process.

Recommendation. Courts should give careful consideration under each of *eBay*’s four factors to the consequences of issuing an injunction prohibiting use of a patented invention incorporated into an industry standard. Whether the patent owner made a RAND commitment will also be relevant to the injunction analysis.

²²E.g., 3M Innovative Properties Co. v. Avery Dennison Corp., No. 01-1781, 2006 WL 2735499, at *2 (D. Minn. Sept. 25, 2006).

Remedies Following Denial of an Injunction

When the analysis leads a court to deny an injunction, the question naturally arises of what remedy to apply. The court opinions that address the question most commonly require ongoing royalties that allow the manufacturer to continue making the infringing product. The Federal Circuit has held that this remedy can be appropriate in lieu of an injunction. No consensus on how to set the royalty rate has emerged from the case law, however. The Federal Circuit has stated only that district courts must articulate a reasonable basis for determining the amount, and that the award should account for the changed relationship of the parties resulting from an adjudicated finding of infringement of a valid patent.

Ongoing royalties. To form a coherent remedies system, the legal rules for ongoing royalties following denial of an injunction must be consistent with the rationale for denying the injunction in the first place. When a court denies an injunction to prevent hold-up, the alternative remedy should not perpetuate the hold-up. The ongoing royalty should be based on a willing licensor/willing licensee model with the assumption that the patent is valid and infringed in order to account for the changed relationship of the parties following litigation. Concerns about preserving the deterrent value of injunctions and patentees' incentives to innovate are best addressed by carefully defining and limiting the circumstances under which injunctions are denied.

Recommendation. The Commission recommends that to fully compensate patentees but avoid creating hold-up, courts base awards of ongoing royalties following denial of an injunction on the willing licensor/willing licensee model, assuming the patent is valid and infringed.

Delaying the injunction. In several instances, courts have granted a permanent injunction but delayed the time for it to commence in order to give the infringer time to design around the patent or the parties time to reach a licensing agreement. Where a design around option is feasible and the infringer is afforded sufficient time to implement it, a delayed injunction can be a useful tool to prevent hold-up while avoiding the concerns associated with denying an injunction for the life of the patent. In addition, allowing the parties time to negotiate a license can conserve judicial resources.

Remedies in the International Trade Commission

Patent holders who believe that imported products infringe their patents may file a complaint with the International Trade Commission (ITC) under Section 337 of the Tariff Act of 1930. Panelists expressed concern that patentees that are unlikely to obtain an injunction in district court under *eBay* may instead pursue a case in the ITC. Such patentees might include patent assertion entities (PAEs) and those whose patent is subject to a RAND commitment for use in a standard. The Federal Circuit has held that *eBay*'s equitable test does not apply to ITC decisions to grant an exclusion order barring importation of infringing products. Thus, unlike the situation in district court, a finding of infringement in the ITC has led to a nearly automatic

exclusion order, which is sometimes tantamount to an injunction. In some circumstances, this outcome could generate hold-up and harm innovation and competition.

Section 337 provides two mechanisms through which the ITC can limit the potential harm from hold-up. The first is through the domestic industry requirement. To file suit in the ITC, a patent owner must meet the domestic industry requirement, which can be satisfied by showing “substantial investment in [the patent’s] exploitation, including engineering, research and development or licensing.”²³ The ITC should interpret the domestic industry requirement as not satisfied by ex post licensing activity solely focused on extracting rents from manufacturers based on marketed products. Consistent with the legislative history’s concern with innovation and the language of the statute, relevant licensing activity can be that which “exploits” the patent through technology transfer that can result in the commercialization of new products and services. This interpretation would limit access to the ITC for PAEs, who are least likely to obtain an injunction under *eBay*, but not other non-practicing patent owners who compete in technology markets.

Second, Section 337 requires the ITC to consider “the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States, and United States consumers” in deciding whether to grant an exclusion order.²⁴ The ITC has rarely used this public interest provision to deny a remedy. But its language should allow consideration of whether an exclusion order based on a minor patented component of a complex product can unduly harm consumers by causing hold-up, distorting competition, raising prices and deterring innovation. These concerns can be especially powerful when a patentee asserts a patent in the ITC that is subject to a RAND commitment against standardized technology.

Recommendation The FTC recommends that the ITC consider whether only those licensing activities that promote technology transfer “exploit” patented technology within the meaning of Section 337, and therefore satisfy the domestic industry requirement. The FTC also recommends that the ITC incorporate concerns about patent hold-up, especially of standards, into the decision of whether to grant an exclusion order in accordance with the public interest elements of Section 337.

²³19 U.S.C. § 1337(a)(3).

²⁴19 U.S.C. § 1337(d)(1).

CHAPTER 1
**EVOLVING PATHWAYS OF INNOVATION: OPEN INNOVATION, TECHNOLOGY
TRANSFER AND EX ANTE PATENT TRANSACTIONS**

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CHAPTER 1

EVOLVING PATHWAYS OF INNOVATION: OPEN INNOVATION, TECHNOLOGY TRANSFER AND EX ANTE PATENT TRANSACTIONS

I. INTRODUCTION

Innovation benefits consumers through the development of new products, processes and services that can improve lives and address unmet needs. It is key to meeting society's greatest challenges in areas as diverse as energy production, communications and health care, and it is essential to sustained economic growth and global competitiveness.¹ But innovation is a complex process. It involves a series of steps from idea to invention through development to commercialization. Both the invention process and the development process can be expensive, risky and unpredictable.²

The goal of the patent system is to promote innovation in the face of that expense and risk. By preventing copying that might otherwise drive down prices, the patent system allows innovators to recoup their investment in research and development (R&D). The patent system's exclusive right promotes innovation, but so too does competition, which drives firms to produce new products and services in the hope of obtaining an advantage in the market. As discussed in the FTC's 2003 Report on the patent system, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy*, the policies that most successfully promote innovation and enhance consumer welfare are those that align the patent system and competition policy by balancing exclusivity and competition.³ Many of the recommendations in the 2003 FTC IP Report focus on improving patent quality as a means of achieving that balance.⁴

Areas of patent law beyond those affecting patent quality can have a significant impact on how the patent system aligns with competition policy. Hearings held by the FTC during 2008

¹OFFICE OF SCI. AND TECH. POLICY, NAT'L ECON. COUNCIL, EXECUTIVE OFFICE OF THE PRESIDENT, A STRATEGY FOR AMERICAN INNOVATION: DRIVING TOWARDS SUSTAINABLE GROWTH AND QUALITY JOBS 4 (2009).

²LEWIS M. BRANSCOMB & PHILLIP E. AUERSWALD, DEPT. OF COMMERCE, BETWEEN INVENTION AND INNOVATION: AN ANALYSIS OF FUNDING FOR EARLY-STAGE TECHNOLOGY DEVELOPMENT 32-41 (2002).

³FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY, Exec. Summ., at 1 (Oct. 2003) ("2003 FTC IP Report"), available at <http://ftc.gov/os/2003/10/innovationrpt.pdf>.

⁴A second report, issued jointly by the Federal Trade Commission and the Department of Justice Antitrust Division in 2007, considers how antitrust law and competition policy can maintain an alignment with the patent system that best promotes innovation. FED. TRADE COMM'N & DEPT. OF JUSTICE ANTITRUST DIV., ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION (April 2007).

and 2009⁵ explored two: (1) notice, meaning how well a patent informs the public of what technology is protected; and (2) remedies, meaning damages and injunctions following a finding of patent infringement. Understanding how patent notice and remedies affect innovation and competition requires that we first examine how the pathways of innovation and the role of patents have evolved. That is the goal of this chapter.

In one important aspect of that evolution, many firms are increasingly embracing “open innovation.” In a traditional or closed model of innovation, a firm relies on its own R&D to create the products it markets. But a firm that pursues an open innovation strategy recognizes that valuable ideas can originate with others and seeks to acquire those inventions that fit its business model. Many of the inventions acquired and commercialized by large firms originate with start-ups and small companies, which account for a steadily increasing percentage of R&D spending.

Consumers benefit from open innovation strategies. Technology transfer permits a division of labor between those who invent and those who manufacture most efficiently. This can speed up the rate of innovation and result in broader, faster distribution of new products to consumers. By providing a pathway for invention without commercialization, technology transfer also lowers barriers to entry for inventors who do not have access to the capital required to build manufacturing facilities and establish distribution channels.⁶ Easier entry supports additional sources of invention, which increases competition among technologies to be further developed or incorporated into products. That competition benefits consumers by resulting in better, cheaper products. Moreover, competition among technologies for development funding is an important mechanism for allocating scarce resources to those inventions having the greatest chance of generating the products most valued by consumers.

The patent system facilitates open innovation and technology transfer in ways that implicate patent remedies and the notice function. The exclusive patent right creates incentives for sellers of technology to invent and buyers of technology to make the purchase and invest in further development. But the nature of the exclusive right depends in part on the remedies available for its infringement. Patents also define rights based on intangible ideas, which helps create a market for technology and makes contracting easier. But a patent’s success in doing so depends upon how well it provides notice of what technology it protects. Chapters 3-8 of this report draw on the insights and information of this chapter in analyzing the law of patent notice and remedies and making recommendations to improve them.

⁵Transcripts and agendas for the hearings and written submissions are available at <http://www.ftc.gov/bc/workshops/ipmarketplace/>. Appendices C, D and E provide lists of hearings participants, agendas and written submissions.

⁶ASHISH ARORA, ANDREA FOSFURI & ALFONSO GAMBARDELLA, MARKETS FOR TECHNOLOGY: THE ECONOMICS OF INNOVATION AND CORPORATE STRATEGY 12-13 (2001).

II. THE INCREASING IMPORTANCE OF OPEN INNOVATION

In a traditional or “closed” model of innovation, a company’s R&D activities lead to internally developed products that the company then markets. The company transfers little technology either into or out of the firm as part of the R&D process, and it forms few collaborations. This was the predominant model of innovation for many companies in the past, especially those having large research arms, like AT&T’s Bell Labs.⁷ Certainly, large companies continue to invent and develop new technologies that they then market,⁸ but many are increasingly receptive to a model of “open innovation.”⁹

A. Open Innovation Embraces Technology Transfer

An open innovation strategy allows invention to flow both into and out of the firm. It recognizes that valuable inventions can come from outside the firm and seeks those that fit well with a firm’s business model. Open innovation can involve collaboration or technology transfer from a company that has invented an idea to another that further develops, uses or markets it. Such technology transfer allows the acquiring firm to leverage external sources of knowledge to support its own innovation.¹⁰

For example, a panelist from Procter & Gamble (P&G) described how that company is pursuing an open innovation approach. Traditionally, P&G’s new products came from internal R&D efforts. But in 2000, the company adopted a goal of acquiring 50% of its innovation from R&D conducted outside of the company. It exceeded that goal in 2008. As a result, the company reports that its R&D productivity has increased by 60%, the rate of its innovation has doubled,

⁷Chesbrough at 214-15 (5/4/09); OPEN INNOVATION: RESEARCHING A NEW PARADIGM 2-3 (Henry Chesbrough, Wim Vanhaverbeke & Joel West eds., 2006) (contrasting closed innovation models like AT&T’s Bell Laboratories with open innovation models). Even in a closed innovation model, knowledge transfer from one firm to another that stimulates further innovation can occur through reverse engineering and review of patent documents.

⁸See, e.g., Yen at 47 (12/5/08) (“Cisco invests more than \$5 billion annually in R&D.”); Krall at 73 (3/18/09) (“Sun reinvests between 15 and 20 percent of its annual revenues back into R&D annually.”); Miller at 148 (3/18/09) (“[Procter and Gamble] invests over \$2.2 billion per year in research and development and we employ over 8,900 scientist[s] in 29 research centers in 13 countries.”); Watt at 12 (5/4/09) (Amgen spent \$3 billion on R&D in 2008); Myers at 220-21 (3/18/09) (Pfizer spends 20% of its revenue on R&D).

⁹OPEN INNOVATION: RESEARCHING A NEW PARADIGM, *supra* note 7, at 2-3. The model of “open innovation” discussed here involves technology transfer in and out of firms. It is not limited to innovation strategies based on open source software, as the term “open innovation” is sometimes used. See *id.* at 82-84 (discussing open innovation based on open source software).

¹⁰*Id.*

and costs have fallen. As a representative of the company explained, by combining P&G's internal innovation with outside sources, "one plus one makes three or five instead of two."¹¹

Similarly, to create new products, large pharmaceutical and biotechnology companies often depend upon external sources of technology, including universities, start-ups and collaborations with other companies.¹² Start-ups typically develop early-stage technology, perhaps obtained from a university, and move it closer to a viable product. If successful, they may partner with or become acquired by a pharmaceutical company, which tests and commercializes the product. For many large pharmaceutical and biotech companies, a majority of their approved drug products begin with externally developed technology.¹³

Companies in the information technology (IT) sector also acquire new, externally developed technology.¹⁴ As one commentator explained, technologies have become so complex that it is not feasible for any one company to be the source of all the innovative aspects of a product. Companies must look outside.¹⁵ One panelist reports that open technology development has "thrived" in the software and internet industries.¹⁶ IT companies use a variety of mechanisms to bring in new technology, including acquisition of start-ups, collaborative arrangements, and IP licenses.¹⁷ For instance, a manufacturing company may take a license

¹¹Miller at 148-50, 154 (3/18/09).

¹²Myers at 220-21 (3/18/09).

¹³Graham at 137 (4/17/09); *see, e.g.*, Shafmaster at 214 (3/18/09) (of seven therapies produced by Genzyme in the last six years, five are protected, in part, by intellectual property in-licensed from universities, and two are based on intellectual property acquired by Genzyme).

¹⁴Cockburn at 188-89 (4/17/09); Rogers at 103 (3/18/09) (in the past four years, Qualcomm has acquired over a dozen companies); Yen at 47 (12/5/08) (Cisco has acquired 130 companies, mostly start-ups, to bring in new technology); Valz at 236 (12/5/09) ("small entities that are actually producing great technology along side IP will get noticed and will do really well" in acquisition in the IT sector); Thomas at 73 (4/17/09) (reporting that "some [of] our most valuable intellectual property has come from smaller companies").

¹⁵Phelps at 244 (5/4/09); Bergelt at 81-82 (4/17/09) (In IT industries, "we're not doing siloed parlayed invention of fundamental technologies the way we did 10 or 15 years ago. We're now inventing higher up in the stack collaboratively."); *see also* BRANSCOMB & AUERSWALD, *supra* note 2, at 43 ("By the 1990s, firms began to out-source more of their needs for component innovation to small and medium sized enterprises.").

¹⁶Valz at 235-36 (12/5/09).

¹⁷Crean at 103 (5/4/09) (listing legal tools for importing technology into a large company).

from a design house that develops technology solely in the hopes of licensing it.¹⁸ This model has become increasingly prevalent in the semiconductor industry since the late 1980s with the emergence of companies that patent their designs and then license them to chip manufacturers.¹⁹

In addition to acquiring technology from external sources, a manufacturing company that pursues an open innovation strategy may also supply its internally developed technology to other firms. If a company makes a promising invention that does not fit well with its business plan, it may seek to sell or license that technology to another firm rather than leave it on the shelf.²⁰ That might occur when a company pursues multiple solutions through R&D but chooses only one to implement. The other solutions may still show promise for different applications.²¹ Looking outside the company for partners to develop and commercialize the otherwise unused technology provides a return on R&D investment, but it also establishes collaborative relationships that can lead to more technology development.²²

B. The Role of Small Companies and Start-ups in Open Innovation

Small companies play an important role in an open innovation paradigm.²³ Data collected by the National Science Foundation indicates that from 1981 to 2005, most of the growth in U.S. industrial R&D spending came from small companies rather than large. In 1981, 70% of R&D spending in the United States was undertaken by companies with more than 25,000 employees.

¹⁸Comment of Innovation Alliance at 2 (2/5/09); Millien at 22 (12/5/08) (noting companies, including AmberWave and Rambus, that have similar business models).

¹⁹Ziedonis at 260 (5/4/09); Bronwyn H. Hall & Rosemarie Ham Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979-1995*, 32 RAND J. ECON. 101-28 (2001); Arora at 31-32 (3/19/09).

²⁰OPEN INNOVATION: RESEARCHING A NEW PARADIGM, *supra* note 7, at 1-3; BRANSCOMB & AUERSWALD, *supra* note 2, at 44; Chesbrough at 215-16 (5/4/09); Phelps at 247-48 (5/4/09) (describing the IP Ventures unit of Microsoft that licenses-out technology for development); *id.* at 245 (IBM license to Motorola and Intel of technology it did not use).

²¹Horton at 168-69 (3/18/09) (GE experience); Miller at 165 (3/18/09) (explaining that P&G invented enzymes useful for detergent that another company licenses for contact lenses).

²²Griswold at 163 (3/18/09) (3M obtains revenue and develops relationships through out-licensing); Miller at 150 (3/18/09) (P&G); Stec at 166 (3/18/09) (Ford); Philips at 167 (3/18/09) (Exxon-Mobil).

²³National Science Foundation, Science and Engineering Indicators 2006, available at <http://www.nsf.gov/statistics/scind06/c4/c4s1.htm>; Samuel Kortum & Josh Lerner, *Assessing the Contribution of Venture Capital to Innovation*, 31 RAND J. ECON. 674 (2000) (estimating that by 1998, venture funding accounted for about 14% of U.S. innovative activity). See also Miller at 150 (3/18/09) (acknowledging that “innovation was increasingly done at small and mid-sized entrepreneurial companies, universities, government labs and by individuals”); Bright at 21 (5/4/09) (companies look to start-ups and universities to create new ideas and new solutions that the company can develop).

Only 4.4% was undertaken by companies with fewer than 1,000 employees. By 2005 those numbers had changed dramatically. Companies with more than 25,000 employees accounted for only 37.6% of R&D spending while the R&D share of companies with fewer than 1,000 employees had grown to 24.1%.²⁴ Since 1980, small and younger firms have accounted for most of the rise in research spending.²⁵

With the growing amount of research and invention located in small companies, technology transfer from small, specialized firms to larger manufacturing firms has become an increasingly important pathway of open innovation.²⁶ Technology can be transferred, or “spin-out” in the other direction too, from a large company to a start-up.²⁷ Universities provide another important source of early-stage technology that can be transferred to start-ups or large companies.²⁸ In 2007, over 500 new companies formed based on technology invented in

²⁴Chesbrough at 212-17 (5/4/09). For a more complete breakdown of R&D spending by company size and year, see Henry Chesbrough, *Specialization and Markets for IP*, presented at FTC Hearing: The Evolving IP Marketplace (May 4, 2009), available at <http://www.ftc.gov/bc/workshops/ipmarketplace/may4/docs/bchcsbrough.pdf>.

²⁵In the early 1970s, only 70 large, industrial R&D firms accounted for the majority of private R&D being performed. By 2000, those firms accounted for less than one third of R&D. Hunt at 54-56 (3/19/09); see Robert M. Hunt, *The Federal Trade Commission’s Hearing on “The Evolving IP Marketplace”*, presented at FTC Hearing: The Evolving IP Marketplace (March 19, 2009), available at <http://www.ftc.gov/bc/workshops/ipmarketplace/mar18/docs/rhuntpdf.pdf>.

²⁶Ashish Arora, Marc Ceccagnoli & Wesley M. Cohen, *Trading Knowledge: An Exploration of Patent Protection and Other Determinants of Market Transactions in Technology and R&D*, in FINANCING INNOVATION IN THE UNITED STATES, 1870 TO THE PRESENT 366, 367 (Naomi R. Lamoreaux & Kenneth L. Sokoloff eds., 2007) (“the available evidence points to a renewal of market exchange of technology”); Hunt at 57 (3/19/09) (“efficient markets for technology are more important than ever”); Meyer at 68-69 (2/12/09) (observing that “oftentimes [commercialization] doesn’t happen within the context of one entity”).

²⁷Phelps at 247-48 (5/4/09) (describing how Microsoft creates spin-out companies).

²⁸Universities are able to license technology developed with government funding through the Bayh-Dole Act. University and Small Business Patent Procedures Act, 35 U.S.C. §§ 200-212 (2006). See Soderstrom at 7-9 (3/18/09) (discussing Bayh-Dole Act). Universities may also receive direct funding from corporate sponsors and enter licensing agreements based on that funding. Mimura at 19-20, 50-55 (5/4/09) (describing \$500 million award by British Petroleum to the University of California’s Lawrence Berkeley Laboratory and the University of Illinois at Urbana-Champaign made in exchange for licensing options).

universities, leading to over 700 new products.²⁹ In that same year, colleges and universities were awarded over 3,000 U.S. patents.³⁰

Open innovation based on technology transfer provides significant benefits to consumers. It allows a division of labor between the creation of new technology and the manufacture and marketing of new products, with the efficiencies of specialization.³¹ Commentators report that small companies are often more creative and agile than large companies when inventing new technology.³² But a large company may be better able to develop the technology into a marketable product and deliver it to consumers. This is especially true when the small company lacks the resources needed for commercialization.³³ Thus, the goal of many start-ups is to attract the investment needed for initial development,³⁴ demonstrate the soundness of its technology,³⁵ and become an attractive target for acquisition or collaboration with a larger company.³⁶

Open innovation based on technology transfer also benefits consumers by increasing sources of new technology and competition among technologies. By removing the need for an inventor to commercialize his invention himself, technology transfer lowers barriers to entry. For instance, the ability of semiconductor design houses to license their technology has allowed them to specialize in one aspect of the semiconductor industry without the need to own

²⁹Soderstrom at 8-9 (3/18/09); *see also* WARF Comment at 1-2 (5/19/09); NATIONAL ACADEMY OF SCIENCES, COMPUTER SCIENCE AND TELECOMMUNICATIONS BOARD, INNOVATION IN INFORMATION TECHNOLOGY 5-8 (2003), available at http://www.nap.edu/html/innovation_in_IT/reportbrief.pdf (university research in information technology led to new product categories with billion-dollar markets).

³⁰U.S. PATENT AND TRADEMARK OFFICE, U.S. COLLEGES AND UNIVERSITIES: UTILITY PATENT GRANTS 1969-2008, available at http://www.uspto.gov/web/offices/ac/ido/oeip/taf/univ/asgn/table_1_2008.htm.

³¹ADAM SMITH, THE WEALTH OF NATIONS (5th ed. 1905) (providing the fountainhead of economic thought about the substantial benefits flowing from division of labor and specialization).

³²ANTHONY BREITZMAN & DIANA HICKS, OFFICE OF ADVOCACY, SMALL BUS. ADMIN., AN ANALYSIS OF SMALL BUSINESS PATENTS BY INDUSTRY AND FIRM SIZE, at v (Nov. 2008) (asserting that small companies are more likely to develop an emerging technology and attempt to build a business around it than are large companies).

³³Edmund W. Kitch, *Elementary and Persistent Errors in the Economic Analysis of Intellectual Property*, 53 VAND. L. REV. 1727, 1740 (2000); Arora et al., *supra* note 26, at 366-67; Arora at 33-34 (3/19/09); Stern at 39 (3/19/09); Bessen at 45 (3/19/09); Bright at 21-22 (5/4/09); Miller at 155 (3/18/09).

³⁴This funding can come from venture capitalists, angel investors and family and friends. Stuart J.H. Graham, Robert P. Merges, Pam Samuelson & Ted M. Sichelman, *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L.J. 1255, 1306-07 (2010).

³⁵James Young Comment (2/5/09); Arora et al., *supra* note 26, at 367; BRANSCOMB & AUERSWALD, *supra* note 2, at 44 (small companies use joint ventures with large companies for access to manufacturing and marketing resources).

expensive manufacturing facilities. Lower barriers to entry into the creation of technology can increase sources of R&D.³⁶ This in turn can increase competition among technologies for funding to be developed and commercialized. That competitive process allocates resources to the most promising ideas having the greatest chance of generating products most valued by consumers.³⁷

III. PATENTS FACILITATE OPEN INNOVATION AND TECHNOLOGY TRANSFER

Patent rights facilitate an open innovation strategy, including collaboration and technology transfer, in multiple ways.³⁸ This can be especially true when start-ups and small companies are involved. This section examines how patents facilitate open innovation in order to identify areas of patent law that impact this dynamic and the alignment of patent law and competition policy.

Patents facilitate open innovation and technology transfer by creating rights based on intangible concepts, which makes contracting easier and helps create a market for ideas.³⁹ As one panelist explained, “the IP serves a very valuable function in being a facilitating force in collaboration with third parties, joint ventures, joint developments. It’s a tool that enables us to do more business with more players in a more open and collaborative fashion.”⁴⁰ In a collaboration, patents can help identify what each party brings to the relationship and how

³⁶Chesbrough at 216-22 (5/4/09). *See also* Maghame at 169-70 (2/11/09) (stating that Tessera, a \$1.2 billion company, has signed up over 50 major companies as licensees); Lord at 174 (2/11/09) (“[Amberware] decided from the outset that the flexibility of the licensing business model made a lot of sense for the company.”); Ryan at 51 (4/17/09) (predicting an increasing number of pure invention and innovation companies that license their technologies).

³⁷A STRATEGY FOR AMERICAN INNOVATION, *supra* note 1, at ii, 6-7; BRANSCOMB & AUERSWALD, *supra* note 2, at 35 (arguing that inventions compete for development funding in a “Darwinian Sea” with “big fish and little fish contending, with survival going to the creative, the agile, the persistent”).

³⁸Chesbrough at 216 (5/4/09) (“[I]ntellectual property can enable this division of the innovation labor.”); Arora at 29-31 (3/19/09) (a market for technology is necessary to establish a division of labor in innovation); Bessen at 45 (3/19/09).

³⁹Stern at 37-41 (3/19/09) (discussing the hypothesis that “effective intellectual property promotes trade in the market for ideas, and, therefore, enhances the efficient cooperative commercialization of new technology”); *id.* at 42 (licensing by entrepreneurs increases dramatically immediately following patent grant); Meyer at 69 (2/12/09) (patents encourage “the dissemination of knowledge that’s developed by one set of individuals and then can be used throughout the economy”).

⁴⁰Horton at 147 (3/19/09). *See also* Kieff at 60-61 (3/19/09) (patents and strong patent rights facilitate coordination among owners of complementary assets).

products of the collaboration will be managed.⁴¹ In a technology transfer agreement, patents can define the rights to be transferred.

Thus, patent transactions (licensing and sales) form the basis of many technology transfer agreements.⁴² Patent transactions that occur as part of a technology transfer agreement can be considered *ex ante* because they occur *before* the purchaser has obtained the technology through other means. Such *ex ante* patent transactions accompanied by technology transfer have great potential for advancing innovation, creating wealth and increasing competition among technologies.⁴³

A. Patent Exclusivity Encourages Invention, Development and Disclosure

Patents play additional roles in facilitating open innovation and technology transfer that go beyond defining rights and supporting *ex ante* patent transactions. They can encourage sellers of technology to invent in the first place and buyers of technology to make the purchase and invest in further development.⁴⁴ By giving a patent owner the right to exclude others from making, using or selling the invention for 20 years,⁴⁵ a patent enables him to capture returns from R&D investment by preventing others from appropriating the invention and driving down prices through infringing competition.⁴⁶

For the patent system to promote innovation effectively, it must do more than encourage invention. It must also encourage the development of inventions to the point of

⁴¹Miller at 154 (3/18/09); Griswold at 159 (3/18/09); OPEN INNOVATION: RESEARCHING A NEW PARADIGM, *supra* note 7, at 10; Chesbrough at 227-28 (5/4/09); Biotechnology Industry Organization (BIO) Comment at 2 (5/15/09).

⁴²Phelps at 250 (5/4/09) (intellectual property rights are the necessary “scaffolding” to build a bridge between two parties).

⁴³Ex *ante* patent transactions contrast with *ex post* patent transactions, which occur *after* the user of the technology has invested in its independent invention and development, without input from the patentee. In this case, the licensee/purchaser already practices the patented technology when approached by the patent owner, so the patent transaction transfers only a legal right, not technology. Chapter 2 discusses the effects of *ex post* patent transactions on innovation and competition among technologies.

⁴⁴See Miller at 154 (3/18/09) (P&G’s open innovation model depends on strong patent protection).

⁴⁵35 U.S.C. § 154(a)(2).

⁴⁶FREDERIC M. SCHERER & DAVID ROSS, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE (3d ed. 1990); Kenneth Arrow, *Economic Welfare and the Allocation of Resources for Innovation, in THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS* 609 (1962). See also Thomson at 88-89 (5/4/09) (patent licensing provides revenues to cover R&D expense while preventing competitors from copying, “under sell[ing] your price and driv[ing] you out of business”).

commercialization, either by the original inventor or through technology transfer by another firm.⁴⁷ An invention may require extensive development before any commercial application is possible.⁴⁸ In a modern economy, development accounts for more than three-fourths of industrial R&D expenditures.⁴⁹ One panelist explained, “[t]he creation of an idea is frequently the least costly and least time consuming aspect of product success. Development budgets vastly exceed research budgets in R&D intensive companies. Much more time and substantially more investment is required to commercialize a product or service embodying an invention than to create the invention in the first place.”⁵⁰

Through the patent, an inventor or purchaser of technology can carve out an exclusive area for development and commercialization in the hope of recouping development costs.⁵¹ For instance, the ability of the patent system to protect early-stage invention and allow investors to recoup development costs is critical to the biopharmaceutical industry, where product development is lengthy, costly and unpredictable.⁵² Panelists from a wide range of other industries, including the pharmaceutical and medical device industries,⁵³ diverse manufacturing

⁴⁷Kieff at 60 (3/19/09).

⁴⁸The period between the basic research generating an invention and the innovation resulting in a commercializable product has been called the “Valley of Death” to dramatize the practical, technological and financial difficulties of early-stage development. See BRANSCOMB & AUERSWALD, *supra* note 2, at 35-41 (detailing those difficulties).

⁴⁹SCHERER & ROSS, *supra* note 46, at 440.

⁵⁰McCurdy at 43 (12/05/08) (IBM’s development budget was 20 times greater than its research budget).

⁵¹SCHERER & ROSS, *supra* note 46, at 444; Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON., 265, 271-72, 276 (1977); Katznelson at 22-23 (3/18/09) (describing how development process evolves and the need to file continuation applications to protect potential products); Horton at 146-47 (3/18/09) (patent rights are needed to support “a return on the successful investments sufficient to make up for the unsuccessful investments”).

⁵²Shema at 15-16, 25 (5/4/09) (“ZymoGenetics and its products would not exist but for patents and but for confidence in a strong U.S. patent system.”); Soderstrom at 9-10 (3/18/09) (initial biotech inventions are “a long way from the marketplace and . . . require a substantial investment over a period of time”); FED. TRADE COMM’N, EMERGING HEALTH CARE ISSUES: FOLLOW-ON BIOLOGIC DRUG COMPETITION 28-30 (June 2009) (describing the innovation cycle for biopharmaceuticals); Pharmaceutical Research and Manufacturers of America (PhRMA) Comment at 5-6 (2/10/09).

⁵³Myers at 221 (3/18/09) (“[I]nnovation by our R&D operations and strong patent protection for that innovation is critical to [Pfizer’s] success.”); Jensen at 218 (3/18/09) (medical device).

industries,⁵⁴ and the IT sector⁵⁵ emphasized the importance of patents to a robust innovation strategy.⁵⁶

Patents can also facilitate open innovation and technology transfer by disclosing available technology. The disclosure of scientific and technical information is part of the consideration that the inventor gives the public in exchange for the exclusive patent right. By offering protection from appropriation even after the invention becomes public, patents encourage inventors to make public what they might otherwise keep secret. That disclosure provides information to potential buyers and helps identify opportunities for collaboration.⁵⁷ Having patents and patent applications can also protect start-ups from copying when they must disclose their inventions to potential investors and collaborators.⁵⁸

⁵⁴ Griswold at 142-43 (3/18/09) (importance of patent system to 3M); Horton at 147 (3/18/09) (at GE, “we see IP as a very strong motivating force to drive innovation and investment in R&D”); Stcc at 152 (3/18/09) (“patents are very important to Ford”); Phillips at 152 (3/18/09) (“But for a strong patent system in the United States, much of [Exxon’s] technology would not be developed or if developed would not be licensed.”).

⁵⁵ Rodgers at 136 (3/18/2009) (“Qualcomm’s “R&D is dependent on a strong patent system.”); Lutton at 90 (5/4/09) (“Patents do allow [Apple] to quantify, capture, protect, and in some cases license the value of our innovations.”); Harris at 72 (3/18/09) (AOL holds 500 patents and uses patents to encourage innovation); Guitierrez at 93, 129-30 (5/4/09) (IP, including patents, is important for protecting innovation in the software industry where barriers to copying are low).

⁵⁶ As documented and discussed at length elsewhere, however, the role that patents play in protecting a company’s technology and how that role compares to other means of recouping R&D costs varies by industry and by the particular circumstances of the company and technology involved. For instance, first mover advantage and trade secrets are often important methods of recouping R&D investments, especially in the IT sector and software industry. See 2003 FTC IP Report, ch. 3, at 1-3; JAMES BESEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK (2008); DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT (2009); W.M. Cohen, R. R. Nelson, & J.P. Walsh, *Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)*, (Nat’l Bureau of Econ. Research, Working Paper No. 7552, 2000).

⁵⁷ SCHERER & ROSS, *supra* note 46, at 444. See Katznelson at 40-42 (3/19/09) (reviewing patents provides technical information and leads to design-around); F. Scott Kieff, *Coordination, Property, and Intellectual Property: An Unconventional Approach to Anticompetitive Effects and Downstream Access*, 56 EMORY L.J. 327 (2006) (patents encourage collaboration).

⁵⁸ Katznelson at 27, 34 (3/18/09); Van Pelt at 119-20 (5/4/09) (start-ups in the IT sector may also seek patents to provide protection against a large firm adopting its technology); Arora et al., *supra* note 26, at 18-19; Hall at 204 (5/4/09).

B. Patenting by Small Companies and Start-ups

The ability of patents to play several roles in facilitating open innovation can be particularly important to small companies and start-ups because they often transfer their technology to larger companies for commercialization. That dynamic, coupled with the dramatic growth in the amount of R&D conducted by small companies, warrants a closer examination of how small companies pursue and use patents to further innovation. That information can help identify the issues that should inform any attempts to align patent and competition policy.

In some sectors, patenting by start-ups appears to be common. One study of start-ups founded between 1987 and 1999 revealed that patenting by start-ups was common in the medical device and semiconductor sectors.⁵⁹ A 2008 survey of high-technology entrepreneurs also found that patent ownership was widespread among responding venture capital-backed start-ups in the biotechnology, medical device and IT hardware industries, although less common in the software industry.⁶⁰ Patenting may be common because start-ups view it as an important means of securing competitive advantage from their technologies.⁶¹

Panelists representing start-ups explained that having patents was important to their ability to attract investment capital.⁶² Without a product, one of a start-up's most valuable assets may be its patent estate, and investors may view patents as important for recouping their investment, according to panelists.⁶³ Investors may also view patents as a signal of technical

⁵⁹Among those that had received venture capital funding, for every \$10 million invested, medical device start-ups filed an average of nine patents, semiconductor firms an average of 6.5 patents, and software firms an average of about three patents per \$10 million invested. Ziedonis 188-93 (12/4/09); Rosemarie Ziedonis, *Startups as Sources of New Technologies . . . and Patents*, presented at FTC Hearing: The Evolving IP Marketplace (May 4 2009), available at <http://www.ftc.gov/bc/workshops/ipmarketplace/may4/docs/rziedonis.pdf>. In each of the three sectors, larger, publicly traded firms have similar patenting rates per R&D spending dollar as do the start-ups of this study. Hall at 200-01 (5/4/09); see Bronwyn Hall, *FTC Panel on Markets for IP and Technology*, presented at FTC Hearing: The Evolving Marketplace (May 4, 2009), available at <http://www.ftc.gov/bc/workshops/ipmarketplace/may4/docs/bhall.pdf>.

⁶⁰Graham et al., *supra* note 34, at 1277 tbl.1 (2010) (97% of responding, venture capital backed biotechnology start-ups sought patents; 94% for medical device; 91% of IT hardware; 67% of software). Start-ups without venture-backing were less likely to hold patents. *Id.*; see also BREITZMAN & HICKS, *supra* note 32 (reporting on patenting rates by small companies).

⁶¹Graham et al., *supra* note 34, at 1287-90.

⁶²Sousa at 89, 116-17 (5/4/09) (explaining that investors in solar cell technology company wanted to see that a start-up has patents, but not all are sophisticated about the content and quality of individual patents); but see Devore at 43 (5/4/09) ("Most venture capitalists use attorneys who are trained . . . to actually look through the portfolios . . . freedom-to-operate analysis is getting more and more savvy.").

⁶³Singer at 228-29 (3/18/09) ("[W]ithout that patent estate, there's really nothing for the venture firm to make an investment in."); Devore at 31 (5/4/09) (venture capitalists seek "the ability to claim the ongoing

merit and promise, or as a defensive measure supporting freedom to operate where the patents of competitors present a risk.⁶⁴ The founder of a medical device company elaborated, “the patent was very important because significant investment was necessary. . . . Every time we got serious with a venture capitalist, they wanted to understand if our patents had teeth, if we could really protect our innovation, and fortunately we did.”⁶⁵ Panelists representing IT start-ups stated that those companies often needed patents to attract investment,⁶⁶ although the importance of having patents depended on the business model of the start-up.⁶⁷ A survey of start-up companies confirms that patents play an important role in attracting all types of investment, but in particular venture capital,⁶⁸ although the degree of importance appears to vary by industry.⁶⁹

For some start-ups, one important feature of the patent system’s exclusive right is that it can allow a new entrant to obtain and maintain a competitive advantage in the market. In some cases, when a new entrant challenges an entrenched incumbent with market power, the new entrant’s patents may be critical to its ability to survive and inject competition into a product market. For instance, one panelist described how patent protection allowed him, as an independent inventor, to develop a medical device invention into a start-up and ultimately a NASDAQ-traded company. His product quickly took market share from the market leader because of its significant advantages. But that market leader began infringing his patent in an

rights to any of the IP that comes from the future research”); Bellon at 227-28 (3/18/09).

⁶⁴See Graham et al., *supra* note 34, at 1306-07; Graham at 217 (4/17/09); Cockburn at 218 (4/17/09); Van Pelt at 87 (5/4/09) (IT start-ups see patents as a risk factor as well); Lutton at 123 (5/4/09) (“The patent value and its necessity to an enterprise is judged really in relation to the business options that it creates.”).

⁶⁵Kiani at 13 (3/18/09); Bright at 30-31 (5/4/09) (At a medical device start-up, “the amount of time that I spend answering questions on the IP is significant.”).

⁶⁶Woolston at 33 (3/18/09) (“the world definitely changes when a patent issues”); Soderstrom at 35 (3/18/09) (in the IT sector, you “don’t even have a conversation” with potential licensors and investors until a patent issues).

⁶⁷Van Pelt at 118-19 (5/4/09) (explaining the role of patents in different business models).

⁶⁸Graham et al., *supra* note 34, at 1306-07. See also PhRMA Comment at 6-7 (2/10/09); BIO Comment at 1-2 (5/15/09); American Intellectual Property Law Association Comment at 1-2 (5/15/09); Lasersohn at 185 (2/11/09). Patents appear less important but not irrelevant for attracting investment in software start-ups. Graham et al., *supra* note 34, at 1308-1309.

⁶⁹Patents appear more important for attracting investment to biotechnology and medical device start-ups compared to software and Internet start-ups. Graham et al., *supra* note 34, at 1282-83; Lemley at 194 (4/17/09) (patents may help attract venture capital for software, but investors place less emphasis on validity and scope of the patents). See also Ronald J. Mann & Thomas W. Sager, *Patents, Venture Capital, and Software Start-ups*, Research Paper No. 057 (2006), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=802806; R. J. Mann, *Do Patents Facilitate Financing in the Software Industry?*, 83 TEX. L. REV. 961 (2005).

attempt to win back customers. Patent litigation, although long and arduous, was successful. He explains, “we had many obstacles, and despite the frustrations we had with the patent system, without it, we wouldn’t be here today.”⁷⁰

Many start-ups seek patents with less focus on entering the market alone and more to improving their chances of entering a successful acquisition or collaboration agreement with a larger firm.⁷¹ For instance, panelists report that a biotech start-up’s patent position is critical to the acquisition decision. Before making the acquisition, the larger company will evaluate whether the start-up’s patents provide sufficient protection for an exclusive market position and whether it will have freedom to operate.⁷² Panelists report that a start-up’s patent position is important to acquisition decisions in the medical device industry also.⁷³

Several factors may motivate the acquisition of a start-up in the IT industry, but panelists report that patents can sometimes be a significant element of the acquisition decision.⁷⁴ The more an acquisition focuses on obtaining and developing new technology, the more important a start-up’s patent position will be.⁷⁵ One IT panelist described attractive acquisition targets as forward looking, with good technology, and a good patent position.⁷⁶ Patents can establish the “bona fides” of the acquisition target, especially when the acquiring company seeks to use the new technology to differentiate its product.⁷⁷ Another panelist explained the patent protection also gives the acquiring company “the opportunity to determine the future course of that technology beyond just what’s inherent in trade secret and knowhow protection.”⁷⁸

⁷⁰Kiani at 12 (3/18/09); *see also id.* at 11-16; Masimo Home Page, <http://www.masimo.com>.

⁷¹Graham et al., *supra* note 34, at 49-51.

⁷²Watt at 48 (5/4/09) (noting that Amgen will not invest in a start-up if the patents are not viable, if they do not afford freedom to operate, or if they cannot create sufficient exclusivity to reward the investment).

⁷³Bright at 21-22 (5/4/09) (utilizing start-ups’ intellectual property is efficient).

⁷⁴Thompson at 107 (5/4/09); Lutton at 124 (5/4/09) (start-ups want to obtain patents because they preserve options that a later-acquiring entity may want to exploit).

⁷⁵Van Pelt at 105, 118-19 (5/4/09); Rogers at 103-04 (3/18/09) (start-up’s patent position is “absolutely critical” to acquisition decision); Sarboraria at 104 (3/18/09) (agrees); Krall at 106-07 (3/18/09) (acquisition strategy of adding complimentary technology requires an examination of the target’s patent position).

⁷⁶Rogers at 103 (3/18/09).

⁷⁷Gutierrez at 102-03 (5/4/09).

⁷⁸Lutton at 102 (5/4/09).

IV. AREAS OF PATENT POLICY THAT AFFECT OPEN INNOVATION AND TECHNOLOGY TRANSFER

The patent system contains multiple areas of law and policy that affect the ability of patents to facilitate open innovation, technology transfer and ex ante patent transactions. Chief among the attributes of a well-functioning patent system in this regard are appropriately granted, valid rights with well-defined boundaries that provide clear notice of what technology is protected and what is not. Panelists were clear about the importance of these attributes,⁷⁹ but they expressed concern about the uncertainty that pervades throughout the patent system and its effect on innovation and competition.⁸⁰

Panelists identified the uncertain validity of issued patents as an important problem.⁸¹ Purchasers of technology often want dependable patent coverage before investing the funds necessary for development and commercialization. They may decide against an investment if not sufficiently confident of the protection provided by key patents, according to some panelists.⁸² Moreover, patents of questionable validity can distort competition and inhibit innovation by discouraging firms from conducting R&D in areas that the patent improperly covers and raising costs through litigation or unnecessary licensing.⁸³ The FTC's 2003 IP Report discusses the importance of patent quality for achieving a proper balance between exclusivity and competition. Because that report makes recommendations for improving patent quality,⁸⁴ this report will not

⁷⁹See e.g., Phelps at 250 (5/4/09); Crean at 96-97 (5/4/09); Stern at 42-43 (3/19/09) (clear and timely patent rights are needed to facilitate a market for ideas); Horton at 164-65 (3/18/09) (clear patent rights are needed to define technology to be transferred and facilitate collaborative relationships); Bessen at 74-75 (3/19/09) (same).

⁸⁰Wagner at 192 (4/17/09); Cockburn at 192-93 (4/17/09); Graham at 142-43 (4/17/09) (uncertainty over the scope and validity of patents adds transaction costs to technology transfer and injects inefficiencies into developing markets for IP).

⁸¹*Id.*; Chesbrough at 228 (5/4/09); Stern at 40-41 (3/19/09).

⁸²See DeVore at 31 (5/4/09); Shema at 32 (5/4/09).

⁸³2003 FTC IP Report, Exec. Summ., at 5-7.

⁸⁴For instance, the report recommends that Congress establish a post-grant review procedure for challenging patent validity and change the standard of proof for invalidating patents from clear and convincing to preponderance of the evidence. 2003 FTC IP Report, Exec. Summ., at 5-7. Some panelists suggested a post-grant review procedure for patents as one way to address the problem of patent quality. Graham at 143 (4/17/09). Other panelists argue that a validity challenge to a start-up's patent can "shut down" its ability to raise the capital needed to develop an invention. Woolston at 57-60 (3/18/09) (discussing the problems of a start-up whose patent is undergoing re-examination in the patent office); Soderstrom at 60 (3/18/09).

delve into that issue. Patent quality remains vitally important for achieving the balance of exclusivity and competition that best enhances consumer welfare, however.

Panelists also identified ill-defined patent boundaries as an important issue for the patent system's ability to facilitate technology transfer and ex ante patent transactions.⁸⁵ Patents that do not clearly identify and define the protected technology undermine attempts at contracting and prevent potential licensors from finding available technologies through a patent search, according to panelists.⁸⁶ One panelist explained, "if you don't have IP rights that are understood by the purveyor of them and the receiver of them, you don't have the necessary scaffolding to build a good . . . bridge there between the two sides."⁸⁷ These concerns directly implicate the patent system's notice function, meaning the ability of a patent to inform the public of what technology it protects. Thus, improvements in the notice function, proposed in Chapter 3, can enhance the ability of the patent system to promote innovation through technology transfer.⁸⁸

Remedies (damages and permanent injunctions) awarded following a finding of patent infringement presented another area of concern for panelists who represent small companies, start-ups and others that frequently engage in technology transfer. These panelists worried that recent proposals, described in Chapter 6, concerning damages could lead to systematically lower damage awards. They argued that reducing the value of patents or injecting additional uncertainty and complexity into damages calculations would undermine the patent system's incentives to invest in risky R&D. Lower damages would also encourage infringement rather than licensing, they argued.⁸⁹ Chapter 2 presents the competing concerns of other panelists that inflated damage awards distort competition among technologies and encourage unproductive litigation. Chapters 4 through 7 attempt to align patent damages law with competition policy by

⁸⁵Chesbrough at 228 (5/4/09); Stern at 40-41 (3/19/09).

⁸⁶Lemley at 147-48 (4/17/09) (observing that notice problems contribute to "leav[ing] a lot of transactional money on the table in the sense that transactions that should have occurred, that would benefit both the buyer and seller, don't occur"); Bessen at 50 (3/19/09) ("deals don't happen that could happen"); Wagner at 192 (4/17/09) ("every bit of uncertainty . . . undermines" the ability to engage in technology transfer).

⁸⁷Phelps at 250 (5/4/09).

⁸⁸There is a trade-off between clear notice and the scope of patent protection, however. Changes that might significantly increase notice might not fully protect an invention and decrease incentives to innovate. Chapter 3, Section IV.B.1, *infra*, discusses this trade-off.

⁸⁹Rhodes at 196 (2/11/09) (if you "decrease damages, you do lose part of the deterrent [e]ffect against infringement"); Lasersohn at 183 (2/11/09) ("If you do not allow inventors to capture the full economic value of their invention . . . the amount of [projects] that will qualify for venture capital financing will decrease."); NanoBusiness Alliance Comment (2/15/09) ("Changes which reduce our ability to receive adequate compensation for infringement of those patents will make it difficult to protect our intellectual property, and therefore will discourage investment in our field.").

balancing these concerns and recommending principles that courts should apply when calculating damage awards.

Similarly, some panelists worried that under the Supreme Court's 2006 decision in *eBay, Inc. v. MercExchange, LLC*,⁹⁰ firms engaged in patent licensing might not be able to obtain a permanent injunction following a finding of infringement. In that case, the Court rejected a "general rule" supporting a permanent injunction and instead announced four equitable factors that a patentee must satisfy to obtain an injunction. Without the ability to obtain a permanent injunction, some panelists argued, their technology might be taken by manufacturing companies without a license.⁹¹ This possibility could decrease the ability of start-ups and technology transfer companies to attract investment and enter into ex ante patent transactions, according to some panelists.⁹² Others welcome *eBay*'s flexibility because it decreases the ability of "non-practicing entities" to extract inflated royalties that distort competition among technologies based on the threat of preventing all sales of an infringing product.⁹³ Chapter 8 presents an analysis that balances these concerns and aligns injunction law with competition concerns.

V. CONCLUSION

The growth of open innovation, especially as evidenced by the dramatic rise in R&D by small companies, involves technology transfer. This trend benefits consumers in multiple ways, including increased levels of innovation and more competition in markets for technology. The patent system supports open innovation and technology transfer by encouraging investment in invention and development, by providing protected disclosure of technology and by defining rights that facilitate contracting.

The notice function of patents and remedies following infringement both implicate how well the patent system can fulfill these roles and promote innovation. Both areas of law also have a significant impact on how the patent system affects competition. The following chapters describe that impact. They also make recommendations for balancing concerns about the importance of patent exclusivity with competition and achieving the proper alignment of patent law and competition policy.

⁹⁰547 U.S. 388 (2006).

⁹¹Cassidy at 165-67 (2/12/09); Lord at 174-75 (12/11/09); Rhodes at 165 (2/11/09) (effective remedies for infringement needed to prevent free-riding on others' R&D).

⁹²Ware at 148 (2/12/09) (expressing concern that "venture capitalists will take their funds elsewhere, and small biotech companies will shrink and die rather than grow"); Ware at 456 (2/12/09) (*eBay* could have an adverse effect on university licensing); Katzenbach at 53-54 (3/18/09) (describing the effect of *eBay* on start-up licensing and business models); Lasersohn at 184 (2/11/09) (injunctions are critical to promoting investment in new technology).

⁹³Chapter 8, Section III.C.

CHAPTER 2
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EX POST PATENT TRANSACTIONS

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CHAPTER 2
THE EVOLVING PATENT MARKETPLACE:
EX POST PATENT TRANSACTIONS

I. INTRODUCTION

While open innovation and technology transfer are important pathways of innovation, not all patent licensing and sales occur *ex ante* as part of a technology transfer agreement. In many cases, the licensee or purchaser already uses the patented technology when approached by the patent owner. What it lacks is a patent license to use the technology. These patent transactions occur *ex post*, *after* a firm has invested in creating, developing or commercializing the patented technology. It needs the *ex post* license to avoid liability even if it invented the technology independent of the patentee because patent infringement is a strict liability offense. A firm that makes, uses or sells patented technology is liable as an infringer, regardless of how it obtained the technology and whether it knew about the patent.¹

The ability of patentees to assert their patents against infringers is important to the patent system's role in promoting innovation and facilitating technology transfer. The threat of a patent infringement suit deters infringement and safeguards the exclusivity that is the heart of the patent system. A business model based on invention followed by technology transfer can only succeed if a firm can prevent copying and recoup its investment in research and development (R&D).

But *ex post* licensing to manufacturers that sell products developed or obtained independently of the patentee can distort competition in technology markets and deter innovation. The failure of the patentee and manufacturer to license *ex ante* with technology transfer results in duplicated R&D effort. When a manufacturer chooses technology for a product design without knowledge of a later-asserted patent, it makes that choice without important cost information, which deprives consumers of the benefits of competition in the technology market. If the manufacturer has sunk costs into using the technology, the patentee can use that investment as negotiating leverage for a higher royalty than the patented technology could have commanded *ex ante*, when competing with alternatives. The increased uncertainty and higher costs associated with *ex post* licensing can deter innovation by manufacturers.

Increasing activity by patent assertion entities (PAEs)² in the information technology (IT) industry has amplified concerns about the effects of *ex post* patent transactions on innovation and

¹See, e.g., *In re Seagate Techs., LLC*, 497 F.3d 1360, 1368 (Fed. Cir. 2007) (en banc). See also *infra* Chapter 3, at 77.

²This report uses the term “patent assertion entity” (PAE) rather than the more common “non-practicing entity” (NPE) to refer to firms whose business model focuses on purchasing and asserting patents that they typically purchase. Taken literally, the term NPE encompasses patent owners that primarily seek to develop and transfer technology, such as universities and semiconductor design houses. Patent assertion entities do not include this latter group. See *infra* Section IV.A of this chapter.

competition. The business model of PAEs focuses on purchasing and asserting patents against manufacturers already using the technology, rather than developing and transferring technology. Some argue that PAEs encourage innovation by compensating inventors, but this argument fails to account for the fact that invention is only the first step in a long process of innovation. Even if PAEs arguably encourage invention, they can deter innovation by raising costs without making a technological contribution.

This chapter examines the causes and effects of ex post patent transactions, including the evolution of the PAE business model. The goal is to identify areas of patent law where improvements could lessen their detrimental effects without undermining the power of the exclusive patent right to promote innovation. Improving patent quality is of paramount importance, as discussed in the 2003 FTC IP Report, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy*.³ Assertion of invalid patents raises costs and deters innovation through licensing and litigation.

Problems with the patent system's notice function are also important. Manufacturers often license ex post because they were not aware of the patent ex ante. Multiple factors can contribute to notice failure, including overbroad, vague claims, the large number of patents potentially relevant to information technology (IT) products, and the pendency of patent applications in the Patent and Trademark Office (PTO). Improvements to the notice function, discussed in Chapter 3, could help decrease the need for ex post transactions while supporting ex ante technology transfer agreements and innovation.

Patent remedies law can unduly encourage ex post transactions when it results in patentee compensation that exceeds the economic value of the invention. If remedies law awards more after a finding of infringement than the patented technology could have commanded when competing with alternatives ex ante, it creates incentives for patentees to wait and seek ex post licensing. Any adjustments in remedies law must be careful not to undermine the patent system's incentives to innovate, however. Chapters 4-8 of this report draw on the insights and information of this chapter and Chapter 1 in analyzing the operation of patent remedies and making recommendations to improve the alignment of those areas of law with competition policy.

II. CONCERNS WITH EX POST PATENT TRANSACTIONS

Ex post patent transactions can have both beneficial and detrimental effects on innovation where the licensee obtained the technology independent of the patent owner. They can also distort competition in markets for technology.

³FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY, Exec. Summ., at 1 (Oct. 2003) ("2003 FTC IP Report"), available at <http://ftc.gov/os/2003/10/innovationrpt.pdf>.

A. Beneficial Effects

The ability of patentees to allege patent infringement and enter ex post patent transactions is a necessary feature supporting the patent system's incentives to innovate. The patent right cannot be exclusive without it. A patent suit can stop infringement and restore an exclusive market position. The threat of suit can deter infringement and enable a patent owner to market its product free of copycat competitors.⁴ Alternatively, threat of suit can lead an infringer to pay royalties to use the invention. Either royalty payments or an exclusive market position can allow a patentee to capture returns from its investment in making and developing an invention, which creates incentives for innovation.⁵

Ex post patent assertions and transactions also provide essential support to business models based on ex ante licensing and technology transfer. A panelist from a specialized R&D firm that licenses its technology to manufacturing firms explained that "there isn't another choice other than to litigate" if it "cannot negotiate licenses with people" who use its technology.⁶ Another panelist argued that the ability to sue for patent damages was necessary to effectively negotiate technology transfer agreements, since otherwise large firms might simply copy the technology and refuse to pay.⁷

B. Detrimental Effects

When a company commercializes technology that it invented independently and later faces a patent assertion, the resulting ex post license provides no direct benefit to consumers, however.⁸ The patentee's act of invention did not contribute to the success of the manufacturer's new product. A manufacturer's royalty payment may raise costs to consumers, but it obtains only the avoidance of infringement litigation, not the benefit of the technology itself. Moreover, the

⁴See Chapter 4 (discussing the role of remedies in safeguarding the patent system's incentives to innovate and deterring infringement); Chapter 8, Section IV.A (discussing the role of injunctions in deterring infringement). See also Epstein at 108-09 (5/4/09) (emphasizing the importance of patent protection where a technology can be easily copied once it is seen in the marketplace).

⁵See Chapter 1, Section II.A.

⁶Maghami at 169-70 (2/11/09).

⁷Lord at 174-75 (2/11/09) (explaining that potential licensors might say "thank you for teaching us about your technology, we're going to go ahead to use it and don't call us, we'll call you").

⁸This analysis of the detrimental effects of ex post patent transactions does not apply when an infringer copied the patentee's technology directly (e.g., by reading the patent) or indirectly (e.g., by copying it from products or services that resulted from the patentee's discovery).

failure to transfer the technology ex ante and the corresponding duplication of inventive effort by the infringer and patentee can reflect a social loss and “inefficient commercialization.”⁹

In this circumstance, patent litigation or royalty payments increase the manufacturer’s costs and risk, deterring innovation.¹⁰ Those costs reduce the manufacturer’s returns on its innovative effort, which could lower its incentive or ability to make future investments in R&D.¹¹ The potential for later patent assertions creates a risk that a manufacturer’s costs will increase and its return on investment will decrease after it has developed and commercialized a product. That uncertainty can also deter the investment in the research, development and commercialization necessary to develop innovative products.¹² Panelists and commentators argued that such patent transactions deter rather than promote innovation by raising costs through a “tax.”¹³ Some have characterized patent assertion against independently created technology as pure rent-seeking.¹⁴

⁹Stern at 43 (3/19/09) (“But if everything is being done ex-post, what you essentially have is inefficient commercialization followed – because the technology is not being transferred effectively ex-ante – followed by costly litigation.”).

¹⁰See generally *infra* Chapter 3, Section II (discussing how poor notice can inhibit innovation and competition).

¹¹See, e.g., Yen at 51 (12/5/08) (estimating average defense costs for large IT companies of “between \$5 to 10 million” and stating that “every assertion we receive distracts our engineers from innovation and productive efforts” that could “otherwise be spent on developing new products”); Quatela at 74 (4/17/09) (describing how litigation diverts engineering resources away from innovation); Kappos at 122 (3/19/09).

¹²See Kappos at 132 (3/19/09) (uncertainty regarding patent scope can make firms “steer clear of innovations that [they would] otherwise want to invest in”); Menell at 127-28 (5/5/09) (the inability to know the potential damages that might result from projects under development “just chills . . . innovation unnecessarily”).

¹³See Daniel P. McCurdy, *Patent Trolls Erode the Foundation of the U.S. Patent System*, Sci. Progress, Fall & Winter 2008/2009 at 82 (the patent system’s treatment of NPEs “can actually serve to diminish competition, and increase prices to consumers, by rewarding entities to not put products and services in the market but rather taxing those that do”), available at <http://www.scienceprogress.org/wp-content/uploads/2009/01/issue2/mccurdy.pdf>; Brian Kahin, Written Submission, *The Patent Ecosystem in IT: Business Practice and Arbitrage*, at 10-12 (Dec. 5, 2008), available at <http://www.ftc.gov/bc/workshops/ipmarketplace/dec5/docs/bkahin2.pdf>.

¹⁴See Merges at 254 (5/4/09); Ziedonis at 259 (5/4/09) (contrasting a “collaborative model” using patents as “scaffolding” with “pure rent-seeking” designed simply to enforce patents); Software & Information Industry Association Comment at 2, 3 (2/5/09) (NPEs “typically do not innovate,” but rather “simply wait for their targets to be successful”); Valz at 239 (12/5/08) (“NPE litigation does suppress value-added licensing activity and drains resources from marketplaces”); Kahin at 63 (12/5/08) (“[I]t’s an incentive to hold back your patents until the technology represented by the patent is embedded in a product or a standard or the marketplace”); Agisim at 211 (2/11/09).

Ex post patent transactions can also distort competition in technology markets and deprive consumers of the benefits of that competition. A manufacturing company may not learn the true cost of its choice among competing technologies when designing its product until the ex post transaction is complete.¹⁵ If the company had been aware that a particular technology was subject to patent licensing fees, it might have adopted a lower-cost technology. Or it could have negotiated lower fees based on the availability of alternatives. Redesign of the product may be costly following commercialization, leading the company to pay the licensing fee rather than alter its product.¹⁶ Thus, the product may be more costly to produce with the patented technology than it would have been if there had been full and effective competition in the technology market.

III. CAUSES OF EX POST TRANSACTIONS

A better alignment of the patent system with competition policy could help address concerns about the detrimental effects of ex post patent transactions on innovation and competition while preserving the benefits of these transactions. Identifying the adjustments to patent law and policy that might accomplish this goal requires that we first explore the causes of ex post transactions.

A. Patent Notice Problems and Patent Quality

In some industries, manufacturers routinely search for patents they must license prior to developing or launching a new product to ensure their freedom to operate. These steps minimize the risk of later patent assertions and ex post transactions.¹⁷ A potential licensee that has found relevant patents can then negotiate a license with the patent holder, adopt alternative, noninfringing technology or abandon the project. The competition between the patented technology and alternatives constrains the royalties that a prospective licensee would pay to license the patent.¹⁸ Consumers can benefit from competition through lower prices or better products.

Ex post patent transactions that can distort competition arise in part from the failure of manufacturing firms to identify patents that cover their products and clear patent rights in

¹⁵See *infra* Chapter 3, at 6-7.

¹⁶See *infra* Chapter 3, Section II (discussing costs of disputes after product launch); Chapter 8, Section IV.B (discussing patent hold-up).

¹⁷See McNelis at 24-27 (5/5/09) (describing the differences in freedom to operate searches in the IT and life sciences sectors); Durie at 17-19 (5/5/09) (describing freedom to operate searches in the pharmaceutical, biotechnology and IT sectors). See also *infra* Chapter 3, Section III.C.

¹⁸See Chapter 7, Section III.A; Gregory K. Leonard & Lauren J. Stiroh, *A Practical Guide to Damages, in ECONOMIC APPROACH TO INTELLECTUAL PROPERTY POLICY, LITIGATION AND MANAGEMENT* 27, 52-58 (Gregory K. Leonard & Lauren J. Stiroh eds., 2005).

advance of commercialization.¹⁹ Manufacturers can fail to identify relevant patents for numerous reasons. For instance, panelists argued that ambiguous claim scope and patent assertions that unreasonably stretched the reach of claims to cover seemingly unrelated products make it impossible to identify all patents that they might eventually face in litigation.²⁰ In some cases, a patent application may be pending in the Patent Office when the manufacturer searches.

These concerns directly implicate the patent system's notice function. Thus, improvements to the notice function, proposed in Chapter 3, could help decrease the extent of ex post patent transactions and better align the patent system with competition. At the same time, improvements to the patent notice function can facilitate ex ante patent transactions and technology transfer, as discussed in Chapter 1. This result could benefit both innovation and competition.

Panelists from the IT industry explained that manufacturers face an additional challenge in trying to identify and clear patent rights due to the large number of patents that cover most IT products. They maintained that an enormous number of potentially relevant, overlapping patents make identifying the applicable rights prior to product launch prohibitively costly.²¹ The IT patent landscape involves products containing a multitude of components, each covered by numerous patents. The high level of patenting in the IT industry²² is in part attributable to the incremental nature of innovation in IT products, where small changes can be patentable. This contrasts with the relationship between products and patents in the pharmaceutical and biotech

¹⁹See Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421, 1445 tbl.1 (2009) (reporting findings from a study indicating that in the vast majority of cases, defendants do not have information about the patent prior to the patent holder asserting a claim of infringement).

²⁰Harris at 123 (3/18/09) (reporting that searches are unlikely to identify patents that might be asserted, since claim scope is often stretched unpredictably); Luftman at 220-21 (2/12/09) (describing NPE assertion of patents covering smart cards against smart phones).

²¹See, e.g., Durie at 18 (5/5/09) ("In my experience on the IT side, it is virtually impossible to conduct a meaningful patent clearance" for complex, multicomponent products.); Krall at 114-15 (3/18/09) ("[i]n the tech industry doing [patent clearance] searches is almost cost-prohibitive"); Sarboraria at 120 (3/18/09); Phelps at 262-63 (5/4/09) (doing a patent clearance "on the front end" is "pretty ineffective" due to the number of patents and many different entities who might have relevant patents). See also Chapter 3, Section II.C.

²²In 2009, IT companies held all of the first ten positions in the list of top patent owners, and nearly all of the top 25. See Intellectual Property Owners Ass'n, Top 300 Organizations Granted U.S. Patents in 2009 (May 24, 2010), available at http://www.ipo.org/AM/Template.cfm?Section=Top_300_Patent_Owners&CONTENTID=25899&TEMPPLATE=/CM/ContentDisplay.cfm&bcsi_scan_1238f9a5e0c9665c=VpkygkCf8Ar0tgDOiVjpyltE0VQBAAAAY1ADAA==&bcsi_scan_filename=Template.cfm. See also Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 46 (2005) (IBM, the world leader, "has amassed over 25,000 U.S. patents" since 1994).

industries where innovation is generally directed at producing a discrete product covered by a small number of patents.²³

The high level of patenting in the IT industry also results from the IT operating companies' strategy of protecting their freedom to operate by developing large defensive patent portfolios that they can assert against a competitor that brings an infringement action.²⁴ One commentator explains that this strategy usually involves acquiring a large quantity of often low quality patents, meaning those that are vague, likely invalid, or that provide narrow coverage of a feature having little commercial value.²⁵ Indeed, IT products are often surrounded by "patent thickets" – densely overlapping patent rights held by multiple patent owners.²⁶

While improving the notice function of patents would help address this problem, raising patent quality will also be central to any solution. Doing so would decrease the number of overbroad or invalid patents that can be asserted against products on the market. IT panelists complained that they frequently faced suits with little merit based on questionable patents, seeking high settlements that reflect the high cost of defending these actions²⁷ and uncertainty regarding litigation outcomes and potential damage awards.²⁸ The FTC's 2003 IP Report

²³ See DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT 53-54 (2009). For a broader discussion of the differences between industries with respect to innovation and the patent system, see *id.*, Chapters 4-5.

²⁴See, e.g., 2003 FTC IP Report, ch. 3, at 35; Krall at 86 (3/18/09) (one reason "to have a portfolio [is] that you can use [it] to defend yourself or defend your customers or your technology communities if they are approached or if they have patent assertions against them by your competitors"); Gutierrez at 128 (5/4/09) (portfolio size "absolutely matter[s]").

²⁵Parchomovsky & Wagner, *supra* note 22, at 69 (describing "the problem of patent portfolios, where large numbers of low-quality patents are obtained with little regard to their validity or actual value," due to their value as an element in a portfolio).

²⁶Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in INNOVATION POLICY AND THE ECONOMY 119 (Adam B. Jaffe et al. eds., 2000); 2003 FTC IP Report, ch. 3, at 34, 52; Thorne at 117 (3/18/09) ("In the high tech business a simple product can have a thousand or more patents [read] on it"); see also Cockburn at 232-33 (4/17/09) (defining a patent thicket as "a large number of patents, . . . potentially overlapping, held by numerous people").

²⁷See, e.g., Durie at 69 (5/5/09) (estimating normal patent litigation costs of \$4 to \$5 million). The American Intellectual Property Law Association's most recent economic survey found that for patent litigations in which over \$25 million was at stake, the cost of litigating a case to completion averaged \$6.25 million. AM. INTELL. PROP. LAW ASS'N., REPORT OF THE ECONOMIC SURVEY I-131 (2009).

²⁸See, e.g., Yen at 51-53 (12/5/08) (the difficulty of challenging "patents of questionable validity and weak arguments of infringement" together with "uncertainty in the calculation of damages" lead IT defendants to settle "unmeritorious" infringement claims and plaintiffs to "request royalties of a magnitude far beyond the . . . fair value of the alleged use"); Slifer at 131-32 (3/18/09) ("uncertainty of

explains that licensing fees for questionable patents can deter innovation and makes recommendations for improving patent quality.²⁹

B. Patent Remedies

Panelists from the IT industry and commentators assert that patent damages law plays an important role in motivating ex post patent transactions. Ex ante licensing negotiations are largely driven by the parties' views on the likely commercial value of the technology in light of available alternatives. Ex post licensing negotiations, on the other hand, are largely driven by how the parties believe they will fare in infringement litigation, including the size of any potential damages award. Although most patent assertions conclude with license agreements or settlements, court awarded damages and injunctive relief "provid[e] a benchmark" for these negotiations.³⁰ IT panelists suggested that patent owners' expectations for recovery in their industry may be unduly affected by very large, well-publicized damage awards that they called "outlier" jury verdicts.³¹ They argued the increase in patent assertions, patent litigation, and ex post patent transactions in their industry is "driven largely by the litigation process and the promise of recovery," the hope for a large damage award.³²

Damage awards that exceed the economic value of the patent, i.e., the amount a patent license could have commanded in an ex ante patent transaction when the patented technology competed with alternatives, can distort competition among technologies. Such damage awards

how the patent is going to be interpreted [and] the uncertainty of how a jury is going to view damages" makes NPE litigation a "good business model"); Simon at 161-62, 202 (2/11/09); Massaroni at 192-93 (2/12/10) (suggesting that hold-up in the IT industry generally involves the assertion of "a patent of dubious quality and prominence" which is "not infrequently the product of a contorted history of continuations"). *But cf.* C.J. Michel at 104-05 (12/5/08) (suggesting that it is unhelpful to speak of patents that are "lacking quality" or "questionable").

²⁹2003 FTC IP Report, Exec. Summ., at 5.

³⁰Underweiser at 159-60 (2/11/09); Marian Underweiser, *Towards an Efficient Market for Innovation* 1, presented at FTC Hearing: The Evolving IP Marketplace (Feb. 11, 2009) ("Court awarded reasonable royalty determinations provide the backdrop against which all patent settlements and patent licensing activities are measured . . ."), available at <http://www.ftc.gov/bc/workshops/ipmarketplace/feb11/docs/munderweiser.pdf>.

³¹Reines at 33 (2/11/09) ("many of the cases never get to complaint and never get to trial, so that . . . anomalous outcomes at trial or fear of anomalous outcomes at trial can drive a whole range of decision-making that's all the way upstream").

³²Lutton at 91 (5/4/09). *See also* Amster at 144 (5/4/09); Gutierrez at 143 (5/4/09) (explosion in litigation is causing inflation in the market for patents to some extent); Crean at 135 (5/4/09) ("if your plan is not to go out and license and litigate or have an offensive licensing program, it at times can be challenging to justify the purchase price that is currently in the marketplace").

can also encourage ex post transactions over ex ante transactions accompanied by technology transfer. As explained in Chapter 4, for these reasons, it is important that damage awards match the ex ante economic value of the patent. On the other hand, it is important that patent damages preserve the patent system's ability to create incentives for invention and innovation, as discussed in Chapter 1. Chapters 4 through 7 provide principles and recommendations on how patent damages law can balance these competing concerns.

Under some circumstances, the grant or threat of a permanent injunction can lead an infringer to pay higher royalties than it would pay in a competitive market for a patented invention. This outcome also can encourage patentees to pursue ex post transactions. At the time a manufacturer faces an infringement allegation, switching to an alternative technology may be very expensive if it has sunk costs in product design and production using the patented technology. That may be true even if choosing the alternative earlier would have entailed little additional cost. If so, the patentee can use the threat of an injunction to obtain royalties covering not only the economic value of the patented invention compared to alternatives, but also a portion of the costs that the infringer would incur if it were enjoined and had to switch, called the hold-up value.³³ As discussed in Chapter 8, one challenge for injunction analysis under *eBay, Inc. v. MercExchange, LLC*³⁴ is to protect the critical importance of patent exclusivity for innovation while recognizing that, in some instances, patent hold-up through injunctions can undermine innovation and harm consumers.

IV. DEVELOPMENTS IN SECONDARY PATENT MARKETS BASED ON EX POST PATENT TRANSACTIONS

Concerns about ex post patent transactions have increased in recent years because the extent and nature of these transactions have changed, at least in the IT industry. Patents in the IT industry are often bought, sold and licensed as assets whose value depends on the amount of rent that can be extracted from manufacturers already using the technology. Such ex post transactions form a secondary market for patents that has a very different impact on innovation and competition than does the market for technology discussed in Chapter 1. Examining the operation of this secondary market and the players in it helps shed light on the extent of the problems associated with ex post patent transactions and the need to examine patent law in light of these problems.

A. Increasing Litigation and Patent Sales in the IT Industry

Panelists from IT manufacturing companies uniformly reported a dramatic increase in the number of patent infringement lawsuits filed against their companies compared to seven to ten

³³See Chapter 8, Sections III & IV (describing the problem of hold-up effectuated by the threat or award of a permanent injunction).

³⁴547 U.S. 388 (2006).

years ago. For several companies, the number of lawsuits at least quadrupled in that period.³⁵ IT companies also report that the number of patents offered to them for purchase or license has significantly increased.³⁶ Panelists noted that some of the offerings are “barely disguised assertions” threatening that “if you don’t buy these patents somebody else will who will sue you.”³⁷ Some offers include claim charts showing how the company’s products infringe or draft patent infringement complaints.³⁸ An IT company’s primary interest in purchasing such patents is usually to avoid suit.³⁹ Panelists complained that evaluating this deluge of patent offers and fighting patent litigation diverts resources from R&D efforts.⁴⁰ Moreover, the patent licenses and purchases resulting from these assertions are primarily ex post transactions in which the manufacturer pays for technology that it is already using without any knowledge of the patent, according to panelists.⁴¹

Recent scholarship suggests that these patent assertions are unlikely to stem from copying. According to one study, patentees rarely allege that defendants in patent litigation have

³⁵Yen at 49 (12/5/08) (reporting a “quadrupling in the past five years” of patent litigation at Cisco where “virtually all of these cases have been with non-practicing entities”); Lutton at 91 (5/4/09) (reporting that Apple faced seven IP suits in 2006 compared to 30 in 2009); Sarboraria at 75 (3/18/09) (Oracle had no IP litigations prior to 2000 and had over 20 in 2009, nearly all NPE); Luftman at 154 (2/12/09) (Palm facing six infringement suits in 2004 compared to 15 in 2009, all but one involving NPEs); Harris at 130 (3/18/09) (AOL faces 30% increases in patent litigation each year for last two years). While overall patent litigation has not risen during this period, one researcher reports that the number of defendants named in patent litigation has increased by approximately 50% since 2004. *See* Kyle Jensen, Counting Defendants in Patent Litigation (Oct. 27, 2010), *available at* <http://www.patentlyo.com/patent/2010/10/guest-post-counting-defendants-in-patent-litigation.html>.

³⁶Sarboraria at 93 (3/18/09) (reporting a “tremendous increase in the offers to sell patents”); Slifer at 88 (3/18/09) (reporting offers of portfolios “at least weekly”); Krall at 91 (3/18/09); Thorne at 90 (3/18/09) (estimating that there were between 10,000 and 20,000 patents potentially relevant to Verizon’s business for sale in 2008).

³⁷Krall at 91-92 (3/18/09); *see also* Yen at 49-50 (12/5/08).

³⁸Lutton at 147 (5/4/09).

³⁹Slifer at 98-99 (3/18/09) (“have to see if there are [patents] in there that would be critical to what we’re doing and what might fall into the wrong hands”); Thorne at 97-98 (3/18/09) (“We’re only buying things that we think might be asserted against us.”); Krall at 99-100 (3/18/09); Bergelt at 36 (4/17/09) (patents acquired by open source affiliate because IP “could potentially represent a threat”).

⁴⁰Krall at 91 (3/18/09) (time devoted to review has doubled); Thorne at 95-96 (“very hard with the volume of patents to make a realistic decision” since evaluating each patent costs “at least the small number of thousands of dollars per patent”). *See also supra* at notes 11, 27-28.

⁴¹Sarboraria at 129 (3/18/09) (reporting that in the “vast majority” of cases “the first notice of the patent was the filing of the lawsuit”); *see also* Yen at 50-51 (12/5/08); Krall at 127-28 (3/18/09); Thorne at 129 (3/18/09).

copied the patented technology, as might be expected if infringement had occurred after technology transfer negotiations. Based on examination of complaints and other court documents, the study found indications of potential copying claims in only 10.9% of all actions, and only 3.2% of IT sector actions.⁴² Moreover, only 4.2% of IT sector cases included allegations indicating that there had been any prior business dealing between the parties.⁴³

According to panelists, the increase in IT litigation and patents offered for sale can be almost entirely attributed to assertions made by patent assertion entities – typically called non-practicing entities – rather than competitors.⁴⁴ The literal definition of non-practicing entity is broad enough to encompass the start-ups, universities, and design houses discussed in Chapter 1. But the term NPE also commonly refers to firms that obtain nearly all of their patents through acquisition or purchase in order to assert them against manufacturers.⁴⁵ Such firms are sometimes called “trolls” by detractors.⁴⁶ For clarity, this report refers to these firms as patent assertion entities (PAEs).⁴⁷ For the most part, PAEs purchase patents, and then sell or license them as assets whose values are based on the amount of licensing fees that can be extracted from operating companies already using and marketing the technology, or they facilitate others who make the assertions.⁴⁸ PAEs can also include patentees that “have turned their focus away from

⁴²Cotropia & Lemley, *supra* note 19, at 1445 tbl.1.

⁴³*Id.* Concerns about the detrimental effects of ex post patent transactions do not apply when accused infringer has copied technology from a patent directly or indirectly. *See supra* note 8.

⁴⁴Thorne at 81 (3/18/09) (reporting that all but one of two dozen patent suits pending against Verizon were brought by NPEs who purchase patents to assert them); Sarboraria at 75 (3/18/09) (“virtually all” patent assertions against Oracle were brought by NPEs); Krall at 127 (3/18/09) (NPEs account for a “majority” of the patent litigation against Sun); Harris at 72 (3/18/09) (NPEs “primarily” responsible for patent assertions faced by AOL).

⁴⁵Some describe NPEs (or PAEs) as employing a “form of arbitrage [that] involves buying patents from those poorly positioned to exploit them, and licensing them to or asserting them against primarily large enterprises, which are in fact making use of the patented technology.” Robert P. Merges, *The Trouble with Trolls: Innovation, Rent-Seeking, and Patent Law Reform*, 24 BERKELEY TECH. L.J. 1583, 1588 (2009) (summarizing the views of other commentators and criticizing their suggestions that such an explanation justifies such transactions as socially desirable).

⁴⁶*See* Merges at 247 (5/4/09) (“[I]n a lot of patent troll situations [...] what’s bothersome about them is that, in fact, there is no information changing hands; it’s strictly a legal relationship. It’s strictly an agreement to make a lawsuit go away.”).

⁴⁷Colleen V. Chien, *From Arms Race to Marketplace: The New Complex Patent Ecosystem and Its Implications for the Patent System*, 62 HASTINGS L.J. 297, 328 (2010) (defining patent assertion entities as entities that “are focused on the enforcement, rather than the active development or commercialization of their patents”).

⁴⁸*See* Hoffman at 119 (4/17/09) (“[I]t’s the size of the market that potentially applies to the patent [I]t has to do with essentially how effective will [the claims] be in an assertion strategy? How likely am I

the active development or practice of their patents and have moved towards patent enforcement.”⁴⁹ Some commentators describe business strategies built around “being infringed,”⁵⁰ while others identify businesses that operate as “opportunistic litigation mills” and do not innovate.⁵¹ Although most PAEs suits are against large companies, they have asserted patents against small companies and start-ups as well.⁵²

PAEs have become pivotal players in the market for patents, especially in the IT sector.⁵³ A recent survey showed that nearly one-third of IT licensing executives reported that “trolls” had had a significant impact on their organization; the corresponding figure did not exceed five percent for any other industry.⁵⁴ One commentator estimates that PAEs have accounted for about 90% of patents purchased at auction in the past few years.⁵⁵ Although data tracking the PAEs in

to generate either damages or royalties if I assert these patents and how big is the market?”); Valz at 236 (12/5/08) (NPEs “have fueled a secondary market for patents which has really intensified this whole idea of licensing without true technology transfer which helps to support innovation”).

⁴⁹Chien, *supra* note 47, at 329.

⁵⁰Brian Kahin, *Patents and Diversity in Innovation*, 13 MICH. TELECOMM. TECH. L. REV. 389 (2007) (“‘Being infringed’ has become a profitable business model for entities with no products on the market. Variations on this model include attacking deep-pocketed companies with large sunk investments in products, ambushing widely implemented industry standards . . . , and pursuing licensing fees from small users that lack the resources to litigate.”) (quoting Markus G. Reitzig, Joachim Henkel & Christopher Heath, *On Sharks, Trolls, and Other Patent Animals – ‘Being Infringed’ as a Normatively Induced Innovation Exploitation Strategy*, available at <http://ssrn.com/abstract=885914>).

⁵¹Merges, *supra* note 45, at 1599.

⁵²See, e.g., Joc Mullin, *The Prior Art, Patent-Litigation Weekly: The Photo-Sharing Files* (May 29, 2009) (reporting on litigation brought by an NPE on image-sharing patents against 60 companies, mainly “small, family-run start-ups”), available at http://thepriorart.typepad.com/the_prior_art/2009/05/patentlitigation-weekly-the-photosharing-files.html.

⁵³Chien, *supra* note 47, at 312, 315, 341-44 (explaining forces that have led to increase in PAE activity and their role in the secondary patent market); see Coalition for Patent Fairness and the Business Software Alliance Comment (2/5/09) at 3 (“The growth of NPEs represents by far the most significant change in the patent marketplace.”). Patent Freedom classifies over 90% of the NPE actions it has identified as involved the IT sector. Patent Freedom, Key Information By Product Category, available at <https://www.patentfreedom.com/research-pc.html>.

⁵⁴Iain M. Cockburn, *Licensing: A View from the Trenches* 7, presented at FTC Hearing: The Evolving IP Marketplace (April 17, 2009), available at <http://www.ftc.gov/bc/workshops/ipmarketplace/apr17/docs/cockburn.pdf>. See also Cockburn at 158-59 (4/17/09).

⁵⁵Chien, *supra* note 47, at 314-15.

the patent marketplace are not available, panelists and commentators have emphasized the central role they have played in expanding the demand for patents in the marketplace.⁵⁶

Researchers have compiled data on the litigation activity of PAEs and the somewhat more broadly-defined group covering all NPEs. Patent Freedom, an IT industry group, reports that the number of patent infringement cases filed by NPEs more than doubled from about 200 during the 2002-2004 period to over 500 in 2008.⁵⁷ While the total number of litigations decreased by about 20% to above 400 between 2008 and 2010, the number of operating companies litigating with NPEs increased by over 25% during the same two-year period.⁵⁸ One study found that PAE-initiated lawsuits accounted for 26% of the defendants sued on computer-related patent actions brought between January 2000 and March 2008, including 30% for software and 40% for financial services.⁵⁹ Another found that NPEs together represent over 80% of the suits filed involving the most-litigated patents (measured as the 106 patents found to have been litigated eight or more times between 2000 and 2007), concluding that “[n]onpracticing entities are clearly an important phenomenon in the modern patent system.”⁶⁰

B. Evolving Patent Assertion Business Models

The purchases, patent assertions, ex post patent transactions, and litigation activities of PAEs take place in a secondary market for patents that includes many types of actors. New

⁵⁶See Malackowski at 49 (4/17/09) (“aggregators who brought capital [] attracted the attention of sellers”); Chien, *supra* note 47, at 312 (“IV [Intellectual Ventures] has had a tremendous influence in developing the market”); Hoffman at 46 (4/17/09); Harris at 95 (3/18/09) (reporting that “the actual purchasing market is really drying up” because “patent aggregators aren’t buying as many”).

⁵⁷Patent Freedom, Patent Lawsuits Involving NPEs Over Time, *available at* <https://www.patentfreedom.com/research-lot.html> (cautioning that the data can include duplicates due, e.g., to related cases and transfers, and fail to include some actions).

⁵⁸*Id.*

⁵⁹Colleen V. Chien, *Of Trolls, Davids, Goliaths, and Kings: Narratives and Evidence in the Litigation of High-Tech Patents*, 87 N.C. L. REV. 1571, 1601 tbl. 4 (2009). This review found that NPEs (defined consistently with PAEs) accounted for a smaller portion – 17% – of all computer-related patent actions over that period, reflecting the tendency of NPEs to sue multiple defendants in a single action. *Id.* at 1600, tbl. 3.

⁶⁰John R. Allison, Mark A. Lemley & Joshua Walker, *Extreme Value or Trolls on Top? The Characteristics of the Most-Litigated Patents*, 158 U. PA. L. REV. 1, 26, 32 (2009). In a subsequent study, these authors found that NPEs, who mainly assert patents against IT products, win only about 10% of their litigated patent cases, which is significantly lower than the win rate of other patentees. John R. Allison, Mark A. Lemley & Joshua Walker, *Patent Quality and Settlement among Repeat Patent Litigants* (Stanford Law and Economics Olin Working Paper, No. 398, at 10 tbl. 3, Jan. 29, 2011), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1677785.

business models, some of which are increasingly sophisticated and complex,⁶¹ have emerged over the past ten years to capitalize on that market. One panelist described 17 business models designed to promote the sale and/or licensing of patent assets.⁶² These business models fall into several broad categories, described below, although an individual firm's activities may place it in more than one category. Knowledge of this fast-changing area can help inform policy responses to the detrimental effects of ex post patent transactions.

Patent enforcement and licensing companies. These firms acquire an interest in patents and assert them against operating companies that they claim are infringing. When operating companies refuse to license, the patent enforcement firms assemble the legal and financial resources required to pursue patent litigation. Patent enforcement firms may also file an infringement lawsuit before opening licensing negotiations.⁶³ Typically, their primary activities are buying, selling, licensing and litigating patents.⁶⁴ They do not conduct research, development, technology transfer or commercialization activities. Some patent enforcement firms have been formed by patent litigation attorneys.⁶⁵

⁶¹ See generally Chien, *supra* note 47, at 312, 315, 326-31, 341-44; Peter N. Detkin, *Leveling the Patent Playing Field*, 6 J. MARSHALL REV. INTELL. PROP. L. 636 (2007); Raymond Millien & Ron Laurie, *Meet the Middlemen*, 28 INTELL. ASSET MANAGEMENT MAGAZINE 53, 53-54 (Feb./March 2008), available at <http://www.iam-magazine.com/issues/article.ashx?g=449a0f0e-630b-4c51-8fb4-2a4fe550f03c>.

⁶² Millien at 21 (12/5/08). See also Raymond Millien, PCT Capital, LLC, *The IP Marketplace Players*, slides 9-10, presented at FTC Hearing: The Evolving IP Marketplace (Dec. 5, 2008), available at <http://www.ftc.gov/bc/workshops/ipmarketplace/dec5/docs/rmillien.pdf> (listing and briefly describing the 17 business models).

⁶³ Panelists from IT companies reported that NPEs are more frequently filing an infringement suit before approaching operating companies about licensing in order to preempt a declaratory judgment suit by the operating companies. Krall at 128 (3/18/09) (explaining that "it was rare we saw any demand letters" after the *MedImmune* decision); Sarboraria at 129 (03/18/09) (stating that Oracle has "seen a decrease in numbers of assertion letters post-*MedImmune*"). See also Miller at 227-28 (12/5/08) (describing how the *MedImmune* decision has lowered the showing needed for potential infringers to bring a declaratory judgment action). See *MedImmune, Inc. v. Genentech, Inc.* 549 U.S. 118 (2007) (patent licensee may bring declaratory judgment action challenging patent validity).

⁶⁴ Millien & Laurie, *supra* note 61, at 53-54.

⁶⁵ Joe Mullin, *Patent Litigation Weekly: Spangenberg Speaks, Says Sue First, Ask Questions Later*, LAW.COM, May 21, 2010, available at <http://www.law.com/jsp/cc/PubArticleCC.jsp?id=1202458625096>; Martha Neil, *Ex-Kirkland Partner Buys 4,500 Patents, Forms New Firm to Sue Infringers*, ABA Journal (June 1, 2010), available at http://www.abajournal.com/news/article/ex-kirkland_partner_buys_4500_patents_forms_new_firm_to_sue_infringers.

One panelist described his firm, Acacia, as an intermediary between small patent holders, who otherwise would lack the resources to enforce their patents, and large alleged infringers.⁶⁶ He explained that Acacia facilitates licensing by screening out many patents and “giving inventors realistic expectations” regarding the value of their inventions.⁶⁷ While initially, failed start-ups and independent inventors supplied many of the patents purchased by PAEs,⁶⁸ a large portion now originate with practicing entities, including large corporations.⁶⁹ As one panelist explained, companies that had been accumulating patents for defensive purposes have recently decided that “they have adequate defenses” and now want “to start generating some return on that portfolio, either through licensing or through sales.”⁷⁰

Litigation finance firms. Litigation finance firms raise money from institutional investors and others to provide capital and other resources to support the patent enforcement efforts of small companies and independent inventors.⁷¹ In exchange, they take a financial

⁶⁶ Ryan at 32-33 (4/17/2009); *id.* at 69-70 (“the patent [can be] rendered moot by the [high] cost[s] of enforcement”). Acacia cited testimonials from small-inventor clients on the benefits of this intermediary relationship. *Id.* at 33-34 (4/17/09). See also Acacia Technologies, Testimonials <http://acaciatechnologies.com/testimonials.htm> (compiling testimonials by patentees that worked with Acacia).

⁶⁷ Ryan at 63-64 (4/17/09).

⁶⁸ Ryan at 43 (4/17/09) (“I think the markets kind of started with small companies and individual inventors who had no way to monetize”); Delgado at 44 (4/17/09) (noting the “progression from smaller independent inventors to very sophisticated companies” auctioning their patents); Malakowski at 44 (4/17/09) (agreeing with Delgado); Ziedonis at 197-99 (5/4/09) (describing the recent increase in the number of patents held by failed IT start-ups at the time of liquidation and the implication for the supply of patents to the secondary market).

⁶⁹ See, e.g., Chien, *supra* note 47, at 314 (observing that half of all patents offered for sale on Ocean Tomo came from practicing entities, and one-quarter from major IT companies such as Sun, IBM, AT&T, 3Com, and Motorola). A number of panelists noted this trend. See Thorne at 126 (3/18/09) (remarking that “patents that were originally prosecuted . . . [by] [F]ortune 50 companies” are now the “[m]ain source of what we see” in the secondary market); Hoffman at 42-43 (4/17/09) (observing that patent sales by large corporations have “dramatically increased in the last couple of years”); Ryan at 44 (4/17/09); Epstein at 95 (5/4/09) (sales of patents were “considered anathema or unforgivable sin for large corporations” a few years ago, but he has sold patents for “some of the very largest corporations in America”).

⁷⁰ Hoffman at 42 (4/17/09). *Id.* at 45 (“[T]he market has transformed pretty dramatically in the last six, maybe eight months” in terms of increased offerings by large companies and decreased demand.).

⁷¹ See, e.g., Millien & Laurie, *supra* note 61, at 55; Tomoya Yanagisawa & Dominique Guellec, *The Emerging Patent Marketplace* 35 (OECD STI Working Paper 2009/9, Dec. 22, 2009) (describing firms that provide “financial support and expertise” to firms who wish to engage in “IP exploitation activities”), available at http://www.oecd.org/dataoecd/62/55/44335523.pdf?bcsi_scan_DA3493EE5FC9D524=QoTyUHsEURXc

interest in patent portfolios. For example, Altitude Capital Partners makes strategic investments in patent owners who are seeking to enforce patents. It also evaluates patent portfolios and designs enforcement approaches.⁷² One panelist reported that contingent fee arrangements are becoming less common for small companies, but that institutional investment funds will now partner with small companies and independent inventors to support patent enforcement.⁷³

Patent aggregators. Patent aggregators build very large portfolios of purchased patents and implement a licensing strategy to earn returns for investors.⁷⁴ The most prominent aggregator is Intellectual Ventures (IV), which was founded in 2000 and began operations in 2003. IV has reportedly amassed more than 30,000 patents.⁷⁵ One panelist estimated that IV accounted for half of all patent purchases over the past few years, and that its recent reduction in purchases had significantly diminished demand in the market for patents.⁷⁶

Intellectual Ventures makes patent acquisitions through funds, which have reportedly raised \$5 billion, and returned \$1 billion to investors to date.⁷⁷ The main revenue stream for the funds reportedly comes from partnership or licensing fees paid by large IT companies.⁷⁸ While not ruling out legal actions, IV emphasized through much of its history that it always reached voluntary licensing agreements.⁷⁹ However, in 2009, it began transferring patents to third parties

jNzwO6gSwQoAAACA+jsE&bcsi_scan_filename=44335523.pdf.

⁷²Altitude Capital Partners, Home Page, <http://www.altitudecp.com/criteria.html>.

⁷³Malackowski at 77-78 (4/17/09).

⁷⁴Millien & Laurie, *supra* note 61, at 54.

⁷⁵Nathan Myhrvold, *The Big Idea, Funding Eureka!*, HARV. BUS. REV., Mar. 2010, at 8; Nigel Page, *IV Shifts Gear*, 36 IAM MAGAZINE 3, 7 (July/Aug. 2009).

⁷⁶Hoffman at 45-46 (4/17/09).

⁷⁷Myhrvold, *supra* note 75, at 9.

⁷⁸Page, *supra* note 75, at 5; Amol Sharma & Don Clark, *Tech Guru Rules the Industry By Seeking Huge Patent Fees*, WALL ST. J., Sept. 17, 2008 (reporting payments for licenses and investment stakes “in the range of \$200 million to \$400 million” from Verizon and Cisco), available at <http://www.signallake.com/innovation/IntellectualVentures091708.pdf>.

⁷⁹Sharma & Clark, *supra* note 78 (quoting Nathan Myhrvold as explaining if he gave such an assurance, the alleged infringers “will rip me off totally”).

to bring litigation.⁸⁰ And at the end of 2010, IV began enforcing patents directly, bringing several high-profile actions against major segments of the high tech industry.⁸¹

Some industry participants have expressed concerns that IV's ability to assert a virtual armada of patents gives it an unusually strong bargaining position. One panelist described IV as betting on a "volume strategy," based on approaching potential licensees with a large portfolio and asking them "how much do you want to bet that at least one of them is really good."⁸² Panelists suggested that it would not be pragmatic to refuse to license similar offers.⁸³

Defensive buying funds. Responding to the rise of IV and other PAEs, "defensive aggregators" acquire patents on behalf of a group of potential PAE targets. Participating firms pay a fee to support patent purchases and the fund licenses back the patents to them. The purchases take patents "off the street" by preventing a PAE from acquiring and asserting the patents against members.⁸⁴ The defensive buying funds generally resell the patents into the marketplace, subject to the licenses, to reduce members' costs and prevent non-members from free-riding on their activities.⁸⁵ One panelist explained that this business model can help IT firms manage their potential liability and take advantage of arbitrage opportunities in the market for

⁸⁰See Zusha Elinson, *Intellectual Ventures Takes Indirect Route to Court*, LAW.COM (Sept. 1, 2009) (reporting that in at least one case, IV reportedly retained a share in any licensing of litigation revenues obtained by the firm that acquired the patent), available at <http://www.law.com/jsp/article.jsp?id=1202433490140>. IV has also transferred patents to a member to use in a counterclaim in patent litigation. See Zusha Elinson, *Verizon Patent Case Marks a First For Intellectual Ventures*, LAW.COM, Feb. 26, 2010, available at <http://www.law.com/jsp/article.jsp?id=1202444656758>.

⁸¹See Don Clark & Dionne Searcey, *Big Patent Firm Sues Nine Tech Firms*, WALL ST. J., Dec. 9 2010, available at http://online.wsj.com/article/SB1000142405274870349350457600744122372926.html?mod=Patently_O

⁸²Hoffman at 121-22 (4/17/09). Myhrvold himself emphasizes the challenges posed by the volume of Intellectual Venture's holdings, telling potential licensees "I can't afford to sue you on all these, and you can't afford to defend on all these." Sharma & Clark, *supra* note 78.

⁸³Delgado at 122-23 (4/17/09) (opining that not licensing would be "an expensive endeavor and [] probably not an incredibly practical one"); Quatela at 123 (4/17/09) (emphasizing the high cost of analyzing a significant number of patents).

⁸⁴Millien and Laurie, *supra* note 61, at 57.

⁸⁵Hoffman at 53 (4/17/09); Bergelt at 53-54 (4/17/09); Amster at 97-99 (5/4/09).

patents.⁸⁶ Such defensive buying funds include Allied Security Trust,⁸⁷ and RPX (Rational Patent Exchange).⁸⁸ One panelist reports that Allied Security Trust has been “successful” in helping to address the volume of patents on the market.⁸⁹ RPX reported in 2010 that it had 35 members and had spent “\$200 million to acquire more than 1,300 patents and patent rights” covering IT technology.⁹⁰

Intermediaries. Licensing agents, brokers and other consultants have emerged to help clients navigate the complex patent landscape and make deals.⁹¹ They help patent owners find licensees and buyers. Other mechanisms, such as patent auction houses and online technology exchanges, also attempt to connect patent owners and potential customers with varying levels of success.⁹²

V. EFFECT OF SECONDARY PATENT MARKETS AND PAE ACTIVITY ON INNOVATION AND COMPETITION

Over the past several years, the patent community has debated the effect of increasing PAE activity and patent market complexity on innovation and competition and how patent policy

⁸⁶Bergelt at 41 (4/17/09).

⁸⁷Allied Security Trust is a nonprofit purchaser and seller of patents, whose members are large high-tech operating companies. See Scott Moritz, *Big Tech Gets Legal Aid in the Patent Wars*, FORTUNE (June 30, 2008), available at <http://money.cnn.com/2008/06/30/technology/patents.fortune>; Allied Security Trust, Home Page, <http://www.alliedsecuritytrust.com/AcquiredPortfolios.aspx>.

⁸⁸Amster at 97-98 (5/4/09). Open Innovation Network, designed to protect the Linux community, uses a somewhat different approach – acquiring patents and making them available royalty-free to those who agree not to assert their patents against the Linux system.
<http://www.openinventionnetwork.com/patents.php>.

⁸⁹Krall at 92 (3/18/09).

⁹⁰Press Release, RPX Corp., RPX Membership Jumps to 35 Companies (Feb. 16, 2010), available at <http://www.rpxcorp.com/index.cfm?pageid=32&itemid=6>.

⁹¹See Hoffman at 35 (4/17/09) (broker and strategic advisor describing his “role as helping the market be as efficient as possible in valuation and transferring of patents”); Millien & Laurie, *supra* note 61, at 54-55. Cf. Cockburn at 213 (4/17/09) (suggesting that one of the main situations in which deals fail is where the parties “don’t have an informed intermediary or a broker”).

⁹²Ocean Tomo ICAP has pioneered live auctions for selling patents, and has plans to develop additional platforms, including online mechanisms, for selling IP rights. See Malackowski at 14-21 (4/17/09) (discussing the OceanTomo live auctions and related platforms under development). Actual transactions have been very limited to date, however. Lemley at 146-47 (4/17/09) (there are “a relatively small number of patents being sold for a relatively small amount of money” at auctions). Other firms are actively pursuing innovative platforms for IP transactions. See, e.g., Yanagisawa & Guellec, *supra* note 71, at 15-22 (reviewing a variety of such endeavors).

should respond. The effect of these developments, like the effect of ex post transactions generally, can be detrimental to innovation. Moreover, some of the asserted benefits of PAE activity appear, on closer inspection, ambiguous at best. Understanding those effects helps patent policy to respond in ways that better align the patent system with competition policy, support the beneficial effects, and lessen the detrimental ones.

The active secondary market for patents facilitated by patent intermediaries has increased the liquidity of patents and provided corresponding benefits to patent owners, according to panelists.⁹³ Both large and small companies are better able to find buyers for patent portfolios that they no longer need or wish to maintain. Selling those portfolios allows companies to recoup some return on the associated R&D investment and raise funds that can be used to support other innovative efforts.⁹⁴ Manufacturing companies can also benefit from an active patent marketplace when they seek to purchase patents that will give them the patent portfolio and freedom to operate needed to move into a new product area.⁹⁵

Supporters of the PAE business model argue that when PAEs purchase patents from independent inventors and small companies in order to assert them, the PAEs provide needed compensation and funding that inventors could not receive otherwise.⁹⁶ Panelists from PAEs explained that independent inventors have great difficulty negotiating royalty payments from large operating companies because they cannot credibly threaten expensive infringement suits. A PAE may serve as “an intermediary between large companies, who use new patented technologies on their products, and the small companies who invented and patented these

⁹³James F. McDonough III, *The Myth of the Patent Troll: An Alternative View of the Function of Patent Dealers in an Idea Economy*, 56 EMORY L.J. 189, 190 (2006) (“Patent trolls provide liquidity, market clearing, and increased efficiency to patent markets . . .”).

⁹⁴ Quatela at 43 (4/17/09) (reporting that Kodak has recently begun targeted selling of patents largely to “fund the transformation that the company is experiencing from an analog manufacturing space to a digital space”).

⁹⁵Gutierrez at 115 (5/4/09) (“when you’re entering into a new area and you feel that you’re exposed, one of the tools that companies will use is the acquisition of patent portfolios in the market”); Lutton at 136 (5/4/09) (praising “the emergence of an efficient marketplace” enabling firms “to align the portfolio with business needs”).

⁹⁶Ryan at 32-34 (4/17/09); Detkin, *supra* note 61, at 636 (“Small companies and individuals have few good options for licensing their patents or developing their inventions without interference from infringers.”); Yuichi Watanabe, *Patent Licensing and the Emergence of a New Patent Market*, 9 Hous. BUS. & TAX L. J. 445, 451 (2009) (“smaller patentees cannot set up an effective licensing operation using conventional business models that are used by the bigger corporations”); John Johnson, Gregory K. Leonard, Christine Meyer & Ken Serwin, *Don’t Feed The Trolls?*, 42 LES NOUVELLES 487, 489 (Sept. 2007) (“The argument espoused by the patent trolls and individual inventors is that patent troll activity helps even the playing field between the individual inventor and the large corporation.”).

technologies.”⁹⁷ Representatives of PAEs maintain that their patent purchases and assertions against operating companies promote innovation by compensating inventors who can then direct their energies toward making more inventions.⁹⁸

Even if it is correct that PAEs incentivize and fund the work of inventors, the effect of this activity on innovation can be detrimental if efforts focus only on ex post licensing and not ex ante technology transfer. Paying inventors only to invent and patent may generate more invention and patents, but it may not generate more innovation. Invention is only the first step in an often lengthy and expensive development process to bring an innovation to market.⁹⁹ More invention creates the potential for more innovation but does not guarantee it.¹⁰⁰ To the extent that patenting and ex post licensing increase the risk and expense of the development and commercialization process of others without providing new technology ex ante, that activity deters innovation.¹⁰¹

Representatives of PAEs also argue that the inventors of the patents they assert would prefer to license their inventions ex ante as part of a technology transfer agreement rather than ex post, but the large companies that could develop those inventions largely ignore them.¹⁰² Representatives of large companies explained that they generally viewed early-stage invention of the type offered in a bare patent license as insufficiently developed to present a good opportunity for bringing new technology into the company.¹⁰³ Large companies seeking to acquire

⁹⁷Ryan at 33 (4/17/09). *See also* Detkin, *supra* note 61, at 644 (describing NPEs as “play[ing] a role in matching patent owners with patent users”).

⁹⁸Detkin at 36 (12/5/08) (“Folks come to us and say, I have invented something cool, I want to go back to inventing, will you help me monetize this. We have capital for that.”); Myhrvold, *supra* note 75, at 8 (describing how Intellectual Ventures buys patents from inventors who “prefer to just hand off their invention to a licensee and move on to the next great idea”).

⁹⁹Chapter 1, Section III.A.

¹⁰⁰Economist Martin Weitzman notes, “the ultimate limits to growth may lie not as much in our ability to generate new ideas, so much as in our ability to process an abundance of potentially new seed ideas into usable forms.” LEWIS M. BRANSCOMB & PHILLIP E. AUERSWALD, DEPT. OF COMMERCE, BETWEEN INVENTION AND INNOVATION: AN ANALYSIS OF FUNDING FOR EARLY-STAGE TECHNOLOGY DEVELOPMENT 1-2 (2002).

¹⁰¹Johnson et al., *supra* note 96, at 490 (“Patent troll activity may tend to an increase in the amount of inventive activity through its positive effect on patent value. At the same time, patent troll activity may inhibit development and commercialization of new inventions by adding unwarranted costs to the commercialization process.”).

¹⁰²Detkin at 30-32 (12/5/08); Ryan at 32-33 (4/17/09).

¹⁰³McCurdy at 74 (12/5/08); Delgado at 61-62 (4/17/09). Panelists from large companies also explained a reluctance to speak with independent inventors for fear that the information exchanged might be used

technology from start-ups often prefer those that have already proceeded successfully to later stages of development and proven viable.¹⁰⁴ This is consistent with the experience of large companies seeking to sell their own internally-developed technology. Microsoft found that simply offering a bare license was insufficient to generate interest in potential buyers. More development and infrastructure was needed.¹⁰⁵

Another argument that PAE activity supports innovation looks to the “salvage value” of patents. Some patents purchased and asserted by PAEs originate with failed start-up companies.¹⁰⁶ Some panelists and commentators assert that the ease with which start-ups can sell their patents into the secondary patent market if the company fails helps them attract much-needed investment. The increased liquidity generated by an active patent market arguably makes it easier for patentees to obtain financing by using their patents as collateral.¹⁰⁷

Other panelists and commentators challenged this contention, however. One noted that the amounts PAEs paid to inventors was too small to provide a significant incentive to invent or funding for future work.¹⁰⁸ Another explained that the salvage value of patents from a failed start-up was too small to encourage the significant investment most start-ups need to develop and

to support a later allegation of willful patent infringement against them. Quatela at 56 (4/17/09); Delgado at 57 (4/17/09).

¹⁰⁴BRANSCOMB & AUERSWALD, *supra* note 100, at 37-38 (describing lack of funding for early-stage technology development). A panelist representing a large biotech company noted that he is less likely to license in basic research and is more concerned with bringing in product opportunities. Watt at 27 (5/4/09). *See also* Lutton at 101 (5/4/09) (licensing a “patent right alone” is the least common vehicle for bringing new technology into the company).

¹⁰⁵ “We put 50 technologies on our website, and we said come and get them. And nothing happened. We learned a very powerful lesson. And that is you just can’t throw technology out there and expect it to succeed. If you really want it to succeed you had to build an infrastructure around it.” As a result, Microsoft has made venture capital, managers, and complementary technologies available to aid potential licensees. Phelps at 247-48 (5/4/09).

¹⁰⁶Massaroni at 151 (2/12/09) (explaining that in the IT industry many patents “of suspect value” come on the market when a firm exits the market and its assets are sold to satisfy creditors).

¹⁰⁷Katznelson at 61 (3/18/09) (“the value of the assets . . . [in the] secondary market valuation is an incredibly important gate for investors to make an investment in your company”); Bergelt at 66 (4/17/09) (observing that in the past dozen years “several billion dollars has been” invested in intellectual property and that the IP is all one has “[i]n the event of a default and foreclosure”); *cf.* Sonderstrom at 62 (3/18/09) (agreeing with Katznelson that this is true in some areas, but not in life sciences).

¹⁰⁸Daniel P. McCurdy, *Patent Trolls Erode the Foundation of the U.S. Patent System*, SCI. PROGRESS 78, 82 (Fall & Winter 2008/2009), available at <http://www.scienceprogress.org/wp-content/uploads/2009/01/issue2/mccurdy.pdf> (NPEs offer “trivial rewards to the inventor”).